



Project Environmental Risk Governance of the Baltic Sea

Case-Study Report: Eutrophication

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Summary

The RISKGOV (Environmental Risk Governance of the Baltic Sea) project points out the importance of the ecosystem approach to management, a structure of governance on both international and national level, and a clear and straightforward assessment as well as communication of environmental risks. The relationship between eutrophication and risk can be summarised in the sentence: “Eutrophication in the Baltic Sea is not a risk, but a fact” (Interview with NGO 2). Eutrophication is a complex phenomenon to adapt into a framework of governance. Nutrient over-loading is not a risk in itself, *i.e.* phosphorus and nitrogen are not ‘traditional toxins’ in the environment, but the effects of an over-stimulated primary production and its ecological consequences pose serious risk scenarios for the entire ecosystem. In terms of risk governance, the effects of eutrophication need adaptive management and an ecosystem approach involving many levels in the marine ecosystem and the surrounding drainage area. This includes processes in nature, political decisions, communication between disciplines and levels of decision-making and simultaneous tackling the other stressors present in the Baltic Sea area. Governance processes and human behaviour are serious barriers for a sustainable recovery and succession of the eutrophied Baltic Sea. The efforts made to counteract eutrophication should be carefully evaluated and mapped in order to minimise risks.

List of abbreviations

BNI	Baltic Nest Institute
BSAG	Baltic Sea Action Group
BSAP	Baltic Sea Action Plan
BSR	Baltic Sea region
BSSSC	Baltic Sea States Subregional Co-operation
CAP	common agricultural policy
CBSS	Council of Baltic Sea States
CCB	Coalition Clean Baltic
DG	Directorate-General
DG ENVI	Environment DG
DHI	Danish Hydrological Institute
EC	European Commission
EEA	European Environmental Agency
EEB	European Environmental Bureau
EU	European Union
HELCOM	Helsinki Commission
ICES	International Council for the Exploration of the Sea
IEEP	Institute for European Environmental Policy
IMO	International Maritime Organization
KBT	Keep Baltic Tidy
LRF	Federation of Swedish Farmers
MSFD	Marine Strategy Framework Directive
MTK	Central Union of Agricultural Producers and Forest Owners
MTT	Agrifood Research Finland
NEFCO	Nordic Environment Finance Corporation
NMR	Nordic Council of Ministers
OSPAR	Oslo Paris Convention
SEPA	Swedish Environmental Protection Agency
SLC	Central Union of Swedish-speaking Agricultural Producers in Finland
SLF	Rural advisory services for Swedish speaking farmers in Finland
SLU	Swedish University of Agricultural Sciences
SYKE	Finnish Environment Institute
UBC	Union of the Baltic Cities
UN	United Nations
WFD	EC Water Framework Directive
WWF	World Wildlife Fund for Nature
WWT	waste water treatment
WWTP	waste water treatment plant

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1. INTRODUCTION

In general, society wants the managers to take the responsibility to protect them from the future (Trush & Dayton 2010). As Mee *et al.* (2008) states, the expression “marine environmental management” in reality refers to management by humans based on the human pressure on the environment. In order to take the right decisions it is essential for management to prefer the long-term perspective for the future benefits of the ecosystem. Ecosystem-based management is a socio-ecological and political process in balancing between several serious issues. Still, the sectoral approach is predominant (Trush & Dayton 2010). The main advantage is to accept the fact that knowledge of complex systems is never complete. The challenge is to construct a mechanism to be robust for the stakeholder to set up goals and targets and for managers to act on them in reality (Mee *et al.* 2008). Therefore it is of importance to detect as many gaps in knowledge as possible.

In an assessment of the Global International Water Assessment (GIWA) launched by Lääne *et al.* (2005), areas of concern in the Baltic Sea region are ranked in the following order: 1) Pollution, 2) Unsustainable exploitation of living resources, especially fish, 3) Habitat and community modification, 4) Freshwater shortages, and 5) Global change. The survey includes both environmental and socio-economic perspectives from present and future conditions (Lääne *et al.* 2005). Also on a global scale, nutrient pollution, *i.e.* the interference with the nitrogen and phosphorus cycles, is top-ranked among processes that could lead to serious environmental changes. In fact, disturbances in the N and P cycles together with climate change and rate of biodiversity loss already have transgressed their boundaries of carrying capacity (Rockström *et al.* 2009). Therefore, questions of priority for both science and management on a regional scale should be how to regain and maintain the carrying capacity for an ecosystem (Ducrotoy & Elliott 2008). In situations where the damage to the ecosystem is an irreversible risk, lack of full scientific certainty is not an argument for disregarding measurements to prevent a deterioration of the environment (Mee *et al.* 2008).

1.1 Eutrophication as a global problem

Eutrophication is defined as an increased input of nutrients or organic matter into an ecosystem, resulting in an increase in primary production (Nixon 1995, 2009). Nutrient over-enrichment caused by human civilisation, also referred to cultural or anthropogenic eutrophication, is one of the oldest environmental problems. The strong increase of human population during the last century has

changed the status of the eutrophication phenomenon from a local to a global issue (Wassmann & Olli 2005). Around 120 million tonnes of N_2 from the atmosphere are converted from human processes every year into reactive forms. This sum corresponds to more than the combined effects from all terrestrial processes on Earth (Rockström *et al.* 2009). The problems of nutrient enrichment are of a macroscopic character, which includes several other sciences, such as physiology, climatology, biogeochemistry, agriculture, and urban infrastructure (Nixon 2009). Eutrophication in marine systems is well described, both on a global and regional level, *e.g.* in Jørgensen & Richardson (1996), Cloern (2001), Boesch (2002), de Jonge *et al.* (2002), and Wassmann & Olli (2005).

1.1.1 The eutrophication process in the aquatic environment

Key-parameters in the detection of changes in an aquatic environment due to eutrophication are the total amounts of phosphorus and nitrogen, chlorophyll *a* and water transparency. Examples of primary effects of enhanced nutrient concentrations are increased production of filamentous algae, changed species composition of microalgae, and an increased risk for harmful, and potentially toxic, algal blooms. Secondary effects, which are affected when the negative impact already have continued for a while, are *e.g.* hypoxia and poorer living conditions for some macroalgal species, zoobenthos, as well as some fish species (Fig. 1.1; Lundberg 2005a). Extended hypoxic or anoxic bottom areas (Dead Zones) are key stressors in marine ecosystems, and on a global scale the Baltic Sea is the largest stressed ecosystem (Diaz & Rosenberg 2008).

As a rule, a marine environment is usually also stressed by other factors than the effects and consequences of eutrophication alone, which can lead to unexpected responses. In a complex system, all processes, abiotic as well as biotic, natural as well as human-induced, are intervoven (Cloern 2001, McQuatters-Gollop *et al.* 2009). Reductions of nutrients to coastal waters may not always improve the eutrophic status. The degradation of organic matter and nutrient cycling can be inhibited by infauna suffered from hypoxia (Conley *et al.* 2007), or by so called internal loading when buried phosphorus is leaking from an anoxic sediment. Other major disturbances, as overfishing, introduction of alien species, and toxic chemicals also influence the recovery and resilience from eutrophication. Variability in climate or nature overall, may further impact this causality (Caddy 1993, Mc Quatters-Gollop *et al.* 2009).

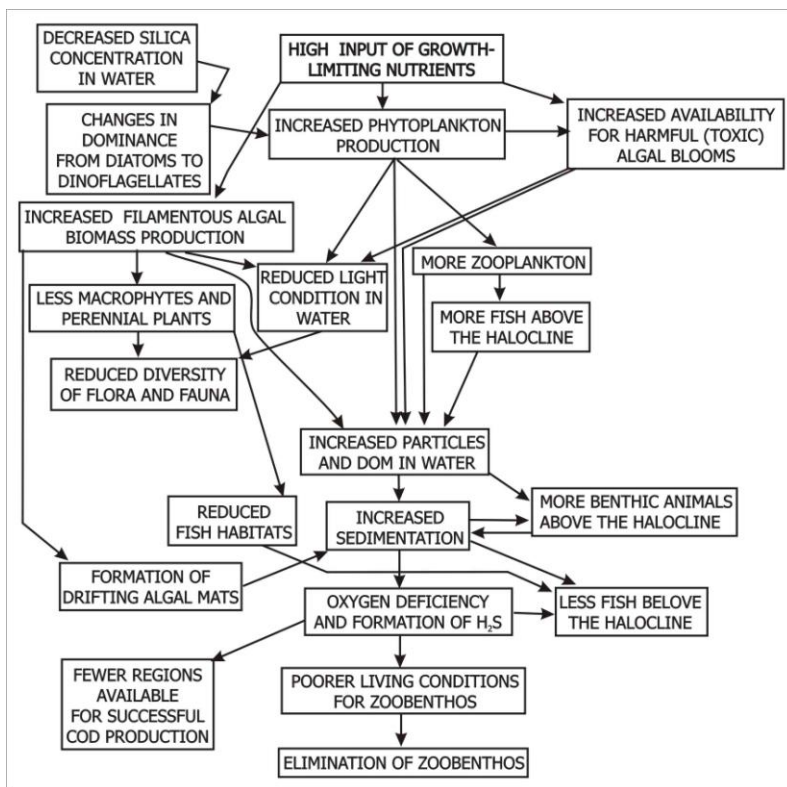


Fig. 1.1 A conceptual model of the environmentally effects of eutrophication in a marine area (Lundberg 2005a).

1.1.2 Eutrophication from a socio-economic perspective

The marine ecosystem is considered to be the most complex (Elliott 2002). Besides the intricate 3pprop-chemical and ecological couplings, marine ecosystems are 3ppropriate3d by long response times, and high levels of uncertainty with regard to environmental damage (Elofsson 2010). Usually, the relationship between socio-economic pressures and changes in the ecological state are non-linear (Mee 2005). For an ecosystem to be sustainable, it is dependent on how management is run and how political decisions are made (Elliott 2002). Traditionally, the governance of marine areas has been fragmented into sectors and countries, and also divided into national and international levels (Mee 2005). The typical example is the fishery management, which has been separated by own laws, policies and institutions (Mee 2005, Mee *et al.* 2008). But the same is true for the agricultural sector. Similarly, the state of the marine environment has given little attention in the linkage to the economic development in the 3ppropriate catchment areas (Mee 2005).

The recent, holistical, perspective of adaptive management and focus on assessment and monitoring for a more effective management strategy, are steps in the right direction for more integrated governance of the marine area. The European Union's Water Framework Directive and Marine Strategy Framework Directive are two examples of usage of the ecosystem approach. The economic

costs for reductions in the effects and consequences of eutrophication are enormous, and demand appropriate management strategies. To choose the most appropriate tactic requires good knowledge how the ecosystem functions as well as how politics are run. Thus, a straightforward communication is of high priority. *E.g.* Elofsson (2002) shows that cost-effective reductions, where they are most needed are more effective than uniform reduction rates for all countries around the Baltic Sea.

1.2 The Baltic Sea

The Baltic Sea is one of the largest brackish water bodies on Earth. It has steep gradients in topography, hydrography and climate, as well as a permanent stratification of the water mass (Leppäkoski & Bonsdorff 1989, Bonsdorff *et al.* 2002). The salinity is decreasing from 15-25 psu in the surface water in the Kattegat, to 0-2 psu in the northern Bothnian Bay (Elmgren & Larsson 2001). These characteristics make the system very species poor with a limited number of ecological functional groups (Bonsdorff & Pearson 1999). Tides are virtually non-existent and during winter the sea is partially covered by ice (HELCOM 1996).

The anthropogenic stress to the Baltic is severe, as 16 million people live on or near the coast and a total of 85 million within the catchment area. The size of the human population will most unlikely increase, but migration and urbanization can still intensify the pressure on the coastal areas (Lääne *et al.* 2005). The large riverine inflow and the shallow and narrow entrance to the North Sea restrict the water exchange and give the Baltic Sea its brackish character. Most of the freshwater, and thereby the highest proportions of nutrients, are delivered by the largest rivers; Neva into the Gulf of Finland, Vistula and Nemunas to the Gulf of Gdansk, Daugava to the Gulf of Riga, and Odra to the Szczecin Lagoon (Stålnacke 1996, Schernewski & Neumann 2005).

1.2.1 Eutrophication in the Baltic Sea

Nutrient over-enrichment, *i.e.* eutrophication, is arguably the most serious threat to the Baltic Sea ecosystem (*e.g.* special issues of Ambio 1990, 2007). The first signs of eutrophication in the Baltic Sea are from the 1960s, when oxygen deficiency in the Baltic Proper was linked to consequences of human activities (Jansson 1997, Elmgren 2001). There was a time lag of two decades before the poor ecological state reached public awareness. By now, the problem of nutrient over-enrichment is well-known, defined and described, and the Baltic Sea is one of the best monitored marine ecosystems in the world with long time data series (HELCOM 2009). The network of prioritization

working for a recovery of the environmental status is also well developed and dynamic among the countries 5rioritizat the Baltic Sea (Kern & Löffelsend 2004).

During the recent years, the scientific perspective in the Baltic Sea has divided into two separate directions. On one hand the focus has changed from treating the whole Baltic as a uniform water body to split it into area-specific effects. On the other hand the mind of thinking has broadened from a sectoral specific view to a holistic approach.

In a by now classic citation in Larsson *et al.* (1985), the total influx of nitrogen to the Baltic Sea has increased approximately four-fold and the increase in phosphorus eight times during the 20th century. According to Elmgren & Larsson (2001), the total annual nutrient load to the Baltic Sea is 1.249.000 tons nitrogen and 56.000 tons phosphorus. The main sources of eutrophication are agriculture and husbandry, industries, aquaculture, municipal sewage water, river run-off and erosion, atmospheric deposition and nitrogen fixation (Elmgren & Larsson 2001, Wassmann & Olli 2005).

1.3 Definitions of risk, coupling risk and eutrophication

The general definions of the term risk is the probability that something bad is happening. Klinké & Renn (2002) define risk as the possibility that human actions or events lead to consequences that harm aspects of things that human beings value. Thus, a subjective valuation of what is good or bad. In economic theory, a risk can be both positive and negative. Considering the environment or the human health, a risk is generally of a negative nature. Risk management is the process of reducing the risk by identification, assessment and 5rioritization, which includes acceptance of society, control, monitoring and public communication (Klinke & Renn 2002).

Eutrophication can not be defined as a risk in itself, but the effects and their consequences (Table 1.1). Thus, eutrophication is a complex phenomenon to involve into risk governance, and both adaptive management and an ecosystem approach are needed. This implies that processes in nature, political decisions, communication between science and decision-making need to be included, as well as other stressors present in the Baltic Sea area.

Table 1.1. The causes and effects of eutrophication and their linkage to ecological and socio-economic risks. See Lundberg (2005b) for references.

<i>Problem:</i>	Eutrophication
<i>Causes; point sources:</i>	Waste water from industries, municipalities Aquaculture
<i>Causes; diffuse sources:</i>	Waste water from scattered dwellings Agriculture, forestry Atmospheric deposition Natural background load
<i>Effects; economic:</i>	Losses in fisheries Losses in tourism Recreation and aesthetic value
<i>Effects; well-fare:</i>	Health Recreation and aesthetic value
→	
<i>Risks for the ecosystem and the human society:</i>	N/P leakage Internal load Oxygen deficiency HAB Biodiversity loss and changes Economical losses Health problems Losses in well-fare

1.4 Our focus

Our focus is to link the concept of risk to the sources, effects and consequences of eutrophication. Risk assessment, and further on risk management and governance, have all the aim to detect and reduce situations of risks and threats. On one hand, strategies and methods for reducing the negative effects of eutrophication in the aquatic environment have to be sustainable from a long-term perspective. On the other hand, governance processes and human behaviour are serious barriers for a sustainable recovery of the eutrophied Baltic Sea. However, the efforts made to counteract eutrophication should be carefully evaluated and mapped in order to minimise risks.

2. Materials and methods

The work presented in the three work packages WP 1-3 is based on an intensive document analysis, literature reviews and an in depth-interview study with a total no of 17 key stakeholders. In the overview of different governmental bodies and other organisations and institutions in work package 1, key documents from HELCOM, the EU and additional literature is analyzed. Generally these are found on the internet pages of the organisations. For the discussion of the governance structures in the Baltic Sea Region, these steering documents are related to secondary sources, *i.e.* scientific publications.

The new empirical material presented in this report stems from qualitative semi-structured interviews with a selection of key stakeholders in Finland and Sweden. The aim with this interview study is to get a broad view of the relations and opinions of the structure, assessment and framing of the eutrophication situation in the Baltic Sea Region, and how eutrophication is seen as a risk by the different stakeholders (scientists, policymakers working in HELCOM and national authorities, representatives from NGOs and industry). During the autumn of 2010 (5.10-11.11) 17 interviews were performed. They were taped and transcribed, while the interviewed persons are assured anonymity. All the interviews are concentrated to Finland and Sweden, with one exception with a scientist from Denmark (Scientist 3; see Table 2.1). The interviews are performed (with one exception) in English. However, the interview made in Finnish is translated to English. The interviews followed a common guideline, which is comparable with the rest of the RISKGOV work, but especially designed to suit key aspects and question in relation to eutrophication in the Baltic Sea Region (for interview guideline see Appendix 1). The interviews for the eutrophication study are divided into 4 governmental organisations: public authorities (6 interviews), scientific institutions (5 interviews), national stakeholders (2 interviews), and non-governmental organisations (4 interviews; Table 2.1).

Table 2.1. The actors and organisations of the conducted interviews during the autumn 2010.

Actor	Organisation	Date of interview
Authority 1	UBC (Union of the Baltic Cities)	5.10.2010
Authority 2	SEPA (Swedish Environmental Protection Agency)	12.10.2010
Authority 3	HELCOM	18.10.2010
Authority 4	Ministry of Environment, Finland	26.10.2010
Authority 5	Ministry of Environment, Sweden	4.11.2010
Authority 6	Ministry of Agriculture, Sweden	9.11.2010
Scientist 1	BNI (Baltic Nest Institute)	12.10.2010
Scientist 2	SLU (Swedish Univeristy of Agricultural Sciences)	13.10.2010
Scientist 3	Lund University	26.10.2010
Scientist 4	DHI (Danish Hydrological Institute)	26.10.2010
Scientist 5	SYKE (Finnish Environment Institute)	2.11.2010
NGO 1	CCB (Coalition Clean Baltic)	13.10.2010
NGO 2	WWF, Sweden	19.10.2010
NGO 3	John Nurminen Foundation	10.11.2010
NGO 4	BSAG (Baltic Sea Action Group)	15.10.2010
Stakeholder 1	MTK (Central Union of Agri-cultural Producers and Forest Owners)	20.10.2010
Stakeholder 2	LRF (Federation of Swedish Farmers)	11.11.2010

3. WP 1: Governance structures and conditions for collaboration

Work packages 1 has the focus on how governance structures, policies and norms are constructed. The most essential governance structures of the Baltic Sea Region are linked to factors of risk due to the processes of eutrophication. The leading regulatory bodies, conventions and networks are examined, and their internal relationships in term of cooperation and conflicting interests are analysed. The aim and purpose are to try to cover the most important actors working with or for a better environmental/ecological status in the Baltic Sea Region, and especially on questions concerning eutrophication.

3.1 Actors present

A collection of actors, organisations and networks of both main and minor importance are checked. They are divided into 7 groups according to their governance structures; global international organisations, regional international organisations, European Union level, international sub-state

and city networks, national organisations, non-governmental organisations (including both international environmental NGOs and philanthrocapitalistic* NGOs), and international financial institutions. The organisations are more thoroughly described in Appendix 2, and are in brief described here.

3.1.1 International, global organisations

ICES - International Council for the Exploration of the Sea

- Intergovernmental network organization for scientists
- Mainly the Atlantic Ocean and the North Atlantic
- Coordination of research in the marine science field by organizing studies and present results.
- Mission: to expand the scientific knowledge of marine ecosystem and thereby to be an adviser in issues regarding how human activities affect the marine environment (ICES 2010a).
- Funded mainly by the member countries (ICES 2008).
- Marine issues for the Baltic Sea:
 - o Baltic Sea Regional Project (BSRP) 2003-2007. Cooperation between ICES, HELCOM, IBSFC (International Baltic Sea Fishery Commission; now closed), the Swedish University of Agricultural Sciences (SLU), and WWF (ICES 2010b).
 - o Working Group on Integrated Assessments of the Baltic Sea (WGIAB). Cooperation between ICES and HELCOM. Assisting the development of indicators for eutrophication and target levels for nutrients in the Baltic Sea (ICES 2007).
 - o Study Group on Nutrients Standards (SGONS). To work with and develop RMNS – Reference materials for nutrients in seawater- with a focus on nitrate, phosphate, nitrite and silicate (ICES 2009).

IMO – International Maritime Organization

- Part of the United Nation
- Environmental vision: to reduce to the barest minimum all adverse environmental impacts from ships (IMO 2010).
- Eutrophication related issues:
 - o Annex IV of MARPOL, Prevention of Pollution by Sewage by Ships

* Businessmen invest financial, intellectual and human capital in projects for public benefits. In contrast to general charity, they use contacts and practices from business management.

In force since September 2003. Problems of health hazards, oxygen depletion and visual pollution in coastal areas when raw sewage from ships is discharged into the sea (IMO 2007).

- Annex VI of MARPOL, Prevention of Air Pollution by Ships

Air pollution originated from ships fuel combustion, regulations about ozone-depleting substances, incineration of PCBs and a Greenhouse gas policy (IMO 2005).

3.1.2 International, regional

HELCOM – The Helsinki Commission

- Substances that pollute the Baltic Sea caused by human activities.
- Intergovernmental cooperation between the contracting parties of the convention (Estonia, Denmark, Finland, Latvia, Germany, Lithuania, Russia, Poland, Sweden and the European Community).
- Aim: to reach a good and well-balanced ecological, marine status in the sea based on 6 principles: responsibility, precautionary principle, best environmental practices and best available technologies, polluter pays principle, monitoring and avoidance of risks (HELCOM, 2010a).
- Duties: monitoring and evaluating the marine environmental status in the Baltic Sea, reviewing the work of the Contracting parties to fulfill their commitments, deciding on recommendations that the contracting parties are expected to follow and implement in national law.
- Approximately 200 recommendations have been adopted since the early 1980s, but far from all have been implemented by all the Contracting parties (HELCOM, 2010a).
- Main working groups:
 - HELCOM LAND, land-based pollution from point and diffuse sources. Identification, suggestions for reducing the emissions (HELCOM, 2010b), evaluation of cost-effectiveness. Evaluation of agricultural policies in different countries and the importance of the EU Common Agricultural Policy (CAP) (HELCOM, 2010c). Projects *e.g.* PURE project (Project on Urban Reduction of Eutrophication) for removal of phosphorus from sewage treatment works (PURE, 2010); The Baltic Sea Joint Comprehensive Environmental Action program (JCP) for listing of active pollutants, “Hot spots”; Baltic Compass (Comprehensive Policy Actions and Sustainable Solutions for Agriculture in the Baltic Sea Region;

HELCOM, 2010d); Balthazar project to protect the Baltic Sea from hazardous waste and from nutrients leakage from agriculture (focus on the areas of St. Petersburg and Kaliningrad; HELCOM, 2010e).

- HELCOM MONAS (Monitoring and Assessment Group). Coordinates the monitoring programmes and the development of indicators, Assessments of current problems and evaluation of actions taken to reverse the trends (HELCOM, 2010f). Projects, *e.g.* The Baltic Sea Pollution Load Compilation, assessments of the total amount of waterborne loads of nutrients (HELCOM, 2010g).
- HELCOM MARITIME for prevention of accidental and deliberate discharges of pollution from ships (HELCOM, 2010h).

The HELCOM Baltic Sea Action Plan – BSAP

- Adopted in 2007, first evaluation in May 2010.
- Main goal: the Baltic Sea will be in a “good environmental status” by the year 2021. Harmonize activities and efforts of the Contracting parties by ecosystem approach to management to achieve the goals and to promote the use of common assessments tools (“HEAT”, HELCOM Eutrophication Assessment Tool; HELCOM, 2009). BSAP deals with recommendations, not strong commitments, but is closely linked and in many ways similar to EU-directives. BSAP is a pilot programme for the MSFD (Backer *et al.* 2009).
- Representatives from the Contracting parties’ governmental and were involved in the development of actions in the plan. The Contracting parties and the EC are actively participated in the final negotiations, other actors (NGOs, international financial institutions) invited as observers (Backer *et al.* 2009).

OSPAR – The Oslo-Paris Convention

- Aim: to protect the marine environment of the North-East Atlantic by the contracting parties (Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the European Community (OSPAR 2010).

The Nordic Council – The Nordic Council of Ministers (NMR)

- Official co-operation in the Nordic Region between Denmark, Island, Finland, Norway, Sweden, the Faroe Islands, Greenland and Åland islands (Norden, 2010a).

- The Nordic Council of Ministers for the Environment (MR-M) is a forum for the ministers of environments (Norden, 2010b). The working group for aquatic ecosystem (AEG) gives support to projects that contribute to increased scientific knowledge and a joint basis in efforts for the Nordic countries regarding marine and coastal environmental issues (Norden, 2010c).

3.1.3 European Union level

Sixth Environment Action Programme (6th EAP)

- Adopted in 2002.
- The framework for the environmental policy of the EU for the period 2002-2012 with 4 priority areas: climate change, nature and biodiversity, environment and health, natural resources and waste.
- Strategies to modernize EU environmental policy making by focusing on measurements for an integrated approach and an effective implementation. Within the marine environment thematic strategy, the Marine Strategy Directive has been developed (EC 2010a).

European Commission (EC)

- The executive body of the European Union.
- A political and administrative body: implementation of EU policies and supervision of the European treaties and laws in the member states.
- Consists of 19 departments, Directorate-Generals (DGs). DGs related to eutrophication are:
 - o Environment DG (DG ENVI); Community Water Policy.
Including: the Urban Wastewater Treatment Directive (91/271/EEC), the Nitrates Directive (91/676/EEC), the Water Framework Directive (2000/60/EC) and the Marine Strategy Framework Directive (2008/56/EC), all are part of the Community Water Policy (Anon. 2009a, p.92).
 - o DG for Agriculture and Rural Development. Including the Common Agricultural Policy (CAP)
 - o DG for Maritime Affairs and Fisheries; Common Fisheries Policy and Maritime Policy
 - o DG for Regional Policy; Regional Policy, with focus on the EU Strategy for the Baltic Sea Region
 - o DG for Health and Consumer Protection; with focus on the Scientific Committee on Health and Environmental Risks

- Northern Dimension policy (EC 2010b).
- Examples of EU bodies working in close collaboration with the Commission: Joint Research Centre (JRC) and the Institute for Environment and Sustainability (IES; EC 2010c, d).

European Parliament (EP)

- 20 Standing Committees (EP 2010), of which the following are eutrophication related:
 - Committee on the Environment, Public Health and Food Safety (ENVI-News 2010a).
 - Agriculture and Rural Development Committee (ENVI-News 2010b).

The Council of the European Union

- Supreme decision making body of the EU with 9 different council configurations, *e.g.* for agriculture, fisheries and environment (Consilium 2010, Europa 2010).

Other EU bodies

- European Environment Agency (EEA) coordinates the European environment information and observation network (Eionet). Provides independent information on the environment for the EC, the member states and other organizations, *e.g.* NGOs (EEA 2010). European Environmental Bureau, EEB, an umbrella group for environmental interests in Europe, facilitates dialogue between NGOs and national governments (EEB 2010).
- Institute for European Environmental Policy, IEEP. An environmental research organisation in the areas of agriculture, fisheries, marine environment, industry, and water management (IEEP 2010).

3.1.4 International sub-state and city networks

Union of the Baltic Cities (UBC)

- Network of over hundred member cities in ten countries.
- Aim: “To contribute to balanced democratic, social, economic and environmental development in the Baltic Sea Region” (UBC 2010a).
- Lead partner of the PURE-project in cooperation with HELCOM, John Nurminen Foundation (investment coordinator) and WWTP in 9 cities around the Baltic Sea (UBC 2010b).

The Council of Baltic Sea States (CBSS)

- Political intergovernmental forum (Ministers for Foreign Affairs) for the Baltic Sea countries + Iceland, Norway and the EC on issues of economic, health, culture, education and environmental protection matters. (CBSS 1992).
- One of the priority areas is maritime policy. Both economic development and the environmental aspects with emissions and wastes.
- CBSS is supporting the development of the HELCOM BSAP (CBSS 2007).

Baltic Sea States Subregional Co-operation (BSSSC)

- Political network, acting as a regional partner to CBSS.
- Aim: transmit the interests of the sub-regions to national governments or the EU (BSSSC 2009).
- Working on a concrete level by supporting projects, one of the main objectives is a “Clean Baltic Sea” (BSSSC 2010).

3.1.5 National organisations

LRF - Federation of Swedish Farmers (Lantbrukarnas Riksförbund)

- Consultative body for the Swedish authorities in agriculture.
- Contribute to development of businesses in the agricultural sector, influence policy decisions at local, regional, national and EU level.
- An observer in HELCOM (LRF 2010a).

MTT Agrifood Research Finland (Maa- ja elintarviketalouden tutkimuskeskus)

- Research institute with focus on agriculture, food and agricultural environment.
- Operates under the Ministry of Agriculture and Forestry and the Ministry of the Board of Trustees (MTT, 2010d) with cooperations with other research institute and universities nationally and internationally (MTT 2010).

MTK - The Central Union of Agricultural Producers and Forest Owners (Maa- ja Metsätaloustuottajain Keskusliitto)

- Organisation of interest for Finnish farmers, rural entrepreneurs and forest owners (MTK 2010a).

- An observer in EC's Committee of Agricultural organizations (COPA) and EC's General Committee for Agricultural Cooperation (COGECA) together with SLC and the Pellervo institute (MTK 2010b).
- An observer in HELCOM (LRF 2010a).
- A partner in the "Baltic DEAL project- Putting Best Practices in Agriculture into Work", which is a flagship project under the EU strategy for the Baltic Sea Region (EU Baltic net 2010).

SLC - The central union of Swedish-speaking agricultural producers in Finland (Svenska Lantbruksproducenternas Centralförbund)

- A smaller Swedish-speaking sister organization to MTK (SLC 2010).

3.1.6 Non-Governmental Organisations

3.1.6.1 International environmental NGOs

WWF (World Wide Fund for Nature)

- Overall aim: "To stop the degradation of the planet's natural environment to build a future in which humans live in harmony with nature".
- Cooperation with *e.g.* the UN, the World Bank and companies (WWF 2010a).
- Funding from *e.g.* individuals, foundations, governments and companies (WWF 2009a). Almost all work is build on collaboration with other partners (WWF 2010b).
- The Baltic Ecoregion Programme has the mission to "save the Baltic marine environment and restore vitality and beauty of the surrounding region" (WWF, 2010c, p.8). Together with *e.g.* LRF, WWF has launched the Baltic Sea Farmer of the Year Award Competition (WWF 2009b).

CCB - Coalition Clean Baltic

- An international network organization of non-profit environmental NGOs from countries around the Baltic Sea with goals in accordance with the mission of CCB.
- Aim: "To promote the protection and improvement of the Baltic Sea environment and natural resources" (CCB 2010).
- Priority areas: "Promotion of good ecological water status", "Prevention of installation and transports harmful to the Baltic Sea environment and coastal areas" and "Development of sustainable Baltic Sea fisheries" (CCB 2010).

3.1.6.2 Philanthrocapitalistic NGOs

Baltic 2020

- A private foundation by Björn Carlsson with a personal donation of 500 million SEK.
- The idea is to use the assets until 2020 by financing innovative projects that will increase the knowledge of the Baltic Sea (Baltic 2020 2009a). Baltic 2020 finance research projects, information spreading and how to influence the public and the decision makers in the right direction. (Baltic 2020 2009b).

Baltic Sea Action Group, BSAG

- Aim to support and promote nature and human welfare by a holistic overview and well targeted concrete actions” (BSAG 2010a).
- Using international Baltic Sea experts as consultants, and acting as an active link between the civil society, decision makers and researchers (BSAG 2010a).
- Examples of projects where BSAG are involved:
 - o Poultry manure treatment project in Leningrad region. (BSAG 2010b).
 - o The Port Waste Reception (PWR) Project.
 - o Baltic COMPASS – Sustainable agriculture in the whole Baltic Sea region. (BSAG 2010c).

John Nurminen Foundation

- Eutrophication and tanker safety are the two focus areas and are organised through the Clean Baltic Sea Projects (John Nurminen Foundation 2010a).
- Funding through donations by individuals, companies, and the public sector (*e.g.* The Swedish International Development Agency and the Finnish Ministry of the Environment; John Nurminen Foundation 2010b, 2010c).
- As an increased phosphorous removal in wastewater treatment plants is a fast and cost-effective way to improve the environmental status, the foundation has invested in wastewater treatment plants in St. Petersburg (John Nurminen Foundation 2010d).
- A partner in the EU-funded PURE-project (John Nurminen Foundation 2010e).
- An advisory expert group with representatives from Finnish Environment Institute, the Finnish Ministry of the Environment and Ministry for Foreign Affairs, the Nordic Investment Bank and the WWF assists the foundation (John Nurminen Foundation 2010f).

3.1.7 International financial institutions

The Nordic Environment Finance Corporation (NEFCO)

- Consists of representatives from Ministry of Environment from the Nordic countries, observers from the NMR and the Nordic Investment Bank (NEFCO 2010a).
- Aim: “To promote cost-effective ways to reduce the environmental pollution emanating from regions adjacent to the Nordic countries” (NEFCO, 2010b).
- Works in collaboration with different funding institutions or the EC. A project is often a partnership between NEFCO and a company (NEFCO, 2010c).
- Manage the BSAP Trust Fund in cooperation with the Nordic Investment Bank, with grants for technical assistance in the projects that work with issues that are relevant for the implementation of the BSAP (NEFCO, 2010d).

3.2 Key steering programmes and directives

HELCOM's Baltic Sea Action Plan (BSAP) can together with the following EU-directives: the Urban Wastewater Treatment Directive (91/271/EEC), the Nitrates Directive (91/676/EEC), the Water Framework Directive (2000/60/EC), and the Marine Strategy Framework Directive (2008/56/EC) be seen as the programmes and directives of greatest importance for the mitigation of eutrophication in the Baltic Sea. The four EU-directives are all part of the Community Water Policy of EU.

3.2.1 The HELCOM Baltic Sea Action Plan (BSAP)

Earlier targets made by HELCOM to reduce the inputs of nitrogen and phosphorus from land-based activities by 50 % have been changed due to the implementation of the ecosystem approach in 2003 and the Baltic Sea Action Plan (BSAP) in 2007. The aim now is to create targets that will directly lead to success in reaching the main goal of “good ecological status” in the Baltic Sea. In the process the status of the ecosystem is compared, by a set of chosen indicators, to the targets that represent the favorable status of the marine environment. With the BSAP, HELCOM took the first step to implement the ecosystem approach to practice (Backer & Leppänen 2008). In addition to environmental concern, the plan also emphasizes the importance of economic as well as social sustainability by advocating cost effectiveness and cost benefits as guiding principles in the selection of measures (HELCOM 2007). Scenarios to evaluate the effectiveness in reaching the targets are estimated by using the Nest model (<http://nest.su.se/nest/>). The data used as a base in the Nest model is information regarding levels of the average nutrient load between the years 1997 and

2003 and the maximum allowable nutrient loads during the same period. Although all the Contracting parties are committed to specific targets to reduce their nutrient pollution, each country can choose their own management strategy to reach the targets, based for example on cost-efficiency (HELCOM 2009).

The BSAP considers agriculture to be the main input source of nitrogen and phosphorus in the Baltic Sea. However, the plan deals with *recommendations* instead of *strong commitments* on how to for example decrease the use of nutrients in agriculture (Backer et al. 2009). The implementation of HELCOM recommendations and action plans at national level are essential but HELCOM also stress the importance of other documents. *E.g.* the legally binding EU- directives for the European Union member states to comply: Marine Strategy Framework Directive (MSFD), the Urban Waste Water Treatment Directive, Water Framework Directive (WFD) and Nitrates Directive (HELCOM, 2009). The BSAP are closely linked and in many ways similar to these EU-directives and the plan is considered to be a pilot for the Marine Strategy Framework Directive (Backer et al. 2009). As a useful complement to BSAP and the EU directives, and with the intention to create a synergistic effect in the work, HELCOM plans to initiate a “Baltic Sea-wide nutrient management strategy”. *“It is further recommended to develop a Baltic Sea-wide nutrient management strategy covering both open and coastal waters that is parallel to the implementation process of the BSAP and relevant EU directives. This would result in the ‘convergence’ of the implementation of the instruments, creating a synergism in this work* (HELCOM 2009 p.13).

3.2.2 Nitrates Directive

The Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources was adopted in 1991. This directive is usually referred to as the Nitrates Directive and the aim is to protect both ground and surface water quality from nitrate pollution caused by agriculture. The directive also aims at promoting the use of good farming practices and is considered one of the key instruments in the protection of waters against agricultural pressures (EC Environment, 2010a, Eur-Lex, 1991a).

In short, the steps of implementation of the directive in the member states were:

- To identify polluted or threatened waters
- To design “vulnerable zones” (areas of land draining into polluted or threatened waters)

- To develop action programmes for the “vulnerable zones” (a set of measures to prevent and reduce nitrate pollution, which in short means that no more than 170 kg animal manure/ha should be spread on these zones)
- To establish codes of good agricultural practice, e.g. time limits when fertilizers can be applied on land (these should be implemented by farmers on a voluntary basis)
- To develop national monitoring programmes with regard to nitrate concentration (both in surface and ground water) and trophic status, and to report to the Commission every four years (EC Environment, 2010a, Eur-Lex, 1991a).

3.2.3 Urban Waste Water Treatment Directive

The *Council Directive 91/271/EEC concerning urban waste water treatment* is normally referred to as the Urban Waste Water Treatment Directive, or the UWWTD. It concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. In 1998 the Directive was amended through the Commission Directive 98/15/EC that also took into consideration discharges from waste water treatment plants to sensitive areas threatened by eutrophication (EC Environment, 2010b, Eur-Lex, 1991b).

The aim of the UWWTD is to protect the public health, water resources and wildlife from the harms caused by waste water discharges. The directive states that waste water, before discharged to the environment, has to be collected and subjected to secondary (biological) treatment according to following time plan:

- Discharges from agglomerations of more than 15000 inhabitants, in 2000, at the latest
- Discharges from agglomeration of between 10000 and 15000 inhabitants, in 2005, at the latest
- Discharges from agglomeration of between 2000 and 10000 inhabitants, in 2005, at the latest (EC Environment, 2010b, Eur-Lex, 1991b).

3.2.4 Water Framework Directive

In mid 1990s the directives regulating the water resources of the EU were numerous and the whole water policy fragmented. The Community water policy was not designed for sustainability but for pollution control in certain waters or by certain pollutants (Lindholm 2002). In 2000 the water policy was renewed through *the Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy*, or the EU

Water Framework Directive (WFD). The new directive replaced several of the former water directives while other pieces of legislation would become complementary to it. The WFD covers all uses and types of water and the ultimate aim is to prevent further deterioration and to achieve a “good status” of all European waters (EC Environment, 2010c, Eur-Lex, 2000).

The purpose of the Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. This means that:

- The aquatic environment will be protected and future deterioration prevented
- Sustainable water use will be promoted, and will be based on long-term protection of available water resources
- Protection of the aquatic environment will be enhanced and improved through reduction of discharges and emissions
- The pollution of groundwater should stop
- The effects of floods and droughts has to be reduced and controlled

The waters of Europe will in the future be managed through River basin management. This means that the water courses affected by the Directive will be divided into separate water units, or river basins, according to the natural geographical and hydrological conditions. Some EU countries already apply a River basin management approach, but for some this will be a new way of looking at the water resources. The Directive requires the member states to develop a river basin management plan for every river basin, and update the plan every six years (EC Environment, 2010c, Eur-Lex, 2000).

The WFD entered into force in 2000 and with it follows a long list of implementation deadlines that the member states have to meet. *E.g.* the transposition into national law should have been completed in 2003. During the year 2010, a pricing policy should be introduced, and in 2015 the aims set by the Directive should have been reached. If the Directive is a success all waters in Europe, both surface and ground should, will by then be of good quality (EC Environment, 2010c, Eur-Lex, 2000).

3.2.5 Marine Strategy Framework Directive

The Directive 2008/56/EC of the European Parliament and of the Council establishing a framework for community action in the field of marine environmental policy, in short the Marine Strategy Framework Directive or the MSFD, was adopted in 2008 with the objective to more effectively

protect the marine environment. Good environmental status of the EU's marine waters shall be achieved as well as recourses that marine-related economic and social activities depend upon shall be protected by 2020 it states. The MSFD is the key to the future EU maritime policy. It is also a complement to the WFD, with similar goals, but dealing with the offshore waters (Eur-Lex, 2008).

According to the directive, European Marine Regions shall be established on the basis of geographical and environmental criteria. The Baltic Sea is considered one of the regions in the Union, the others being the North-East Atlantic Ocean, the Mediterranean Sea, and the Black Sea. Countries bordering the Marine Region, both Union members and non-members, are required to develop strategies for the common sea area, and to coordinate the strategy between them. The strategy has to contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes. By 2012 the member states shall provide the Commission with a comprehensive assessment of the state of the marine region, identifying the main pressures on the region as well as defining targets and monitoring indicators. By 2015 coherent and coordinated programmes for measures intended to be taken has to be presented (Eur-Lex, 2008).

3.2 Governance structures

In environmental questions concerning the aquatic environment, the international level of governance has a steering position in governance, represented by mainly EU and HELCOM, but also global organisations such as IMO and ICES have influence. Still, the nation states are the dominant actors in governance of EU and HELCOM. HELCOM has also made an effort to harmonise and consolidate its regulations and activities with other international regimes and organisations. *E.g.* HELCOM's and OSPAR's recommendations are nowadays more or less into line with each other, and the EU regulations are also in connection with the work of HELCOM. NGOs and subnational organisations have a more indirect position, which include membership in project or working groups, or an observer status in the processes surrounding decision-making.

As the only inside sea area in the European Union, the Baltic Sea has got the role as a model area of regional cooperation. In practice, new ideas and approaches can be tested and developed over time as best practice examples. The Baltic Sea region is called a macro-region inside the EU as consisting of a number of administrative regions sharing a sufficient issue, the ecological status of the Baltic Sea. To justify on a joint approach, there is a need for increased coordination among the

sectoral policies (EC 2009a). The Baltic Sea classified as a Particular Sensitive Sea Area by IMO in 2005 act as a strong base for further work (IMO 2010). Besides sharing a common sea, the countries surrounding the Baltic are divided into a rich Northern and Western part and a developing Eastern and Southern part (Joas *et al.* 2008, EC 2009a). EU Strategy for the Baltic Sea Region was endorsed by the European Council in October 2009 since the European Commission had adopted a Communication in June 2009. This Communication expects of that many of EU's policies and programmes will act as key elements in the strategy, such as the Cohesion Policy and the Common Agricultural Policy (CAP). Also the HELCOM BSAP and the Marine Strategy Framework Directive shall be used as guides regarding interventions for environmental concern (COM 2009). HELCOM BSAP has a key role for the implementation of the Strategy and the environment objectives. Russia's involvement in the framework of the Northern Dimension Environmental Partnership is positive for the development of the strategy.

The number of networks and non-governmental actors in the Baltic Sea region is dense compared to other areas inside the European Union. Also, the hierarchical structures of these actors are highly diverse (Kern & Löffelsend 2008). Sustainable development and concern of the environment are strong driving forces of the international cooperation in the Baltic Sea Region. Traditionally, the Nordic countries have close contacts through the Nordic Council of Ministers (NMR), but also HELCOM has had a strong position in the collaboration work between the Baltic countries since the early 1980s. During the latest decade EU has got the position of the strongest international actor in the Baltic Sea region due to the enlargement of the union (Kern & Löffelsend 2008, Kern *et al.* 2008). The importance of EU regulations has strengthened its role as a main actor also in the Baltic Sea Region. Besides the governments of the EU countries, most of the organisations working towards the EC as a third party (Joas *et al.* 2007), or are dependent on funding from the EU.

For the implementations of policies to be successful, cooperation of multiple actors is required (Joas *et al.* 2007). The interlinkages and cooperations between different levels of actors – both vertically and horizontally – with environmental problem in particular and eutrophication in special, are seen in Figure 3.1. In issues dealing with eutrophication, the governance is mainly managed by the international regional and the European Union levels, *i.e.* HELCOM and EU.

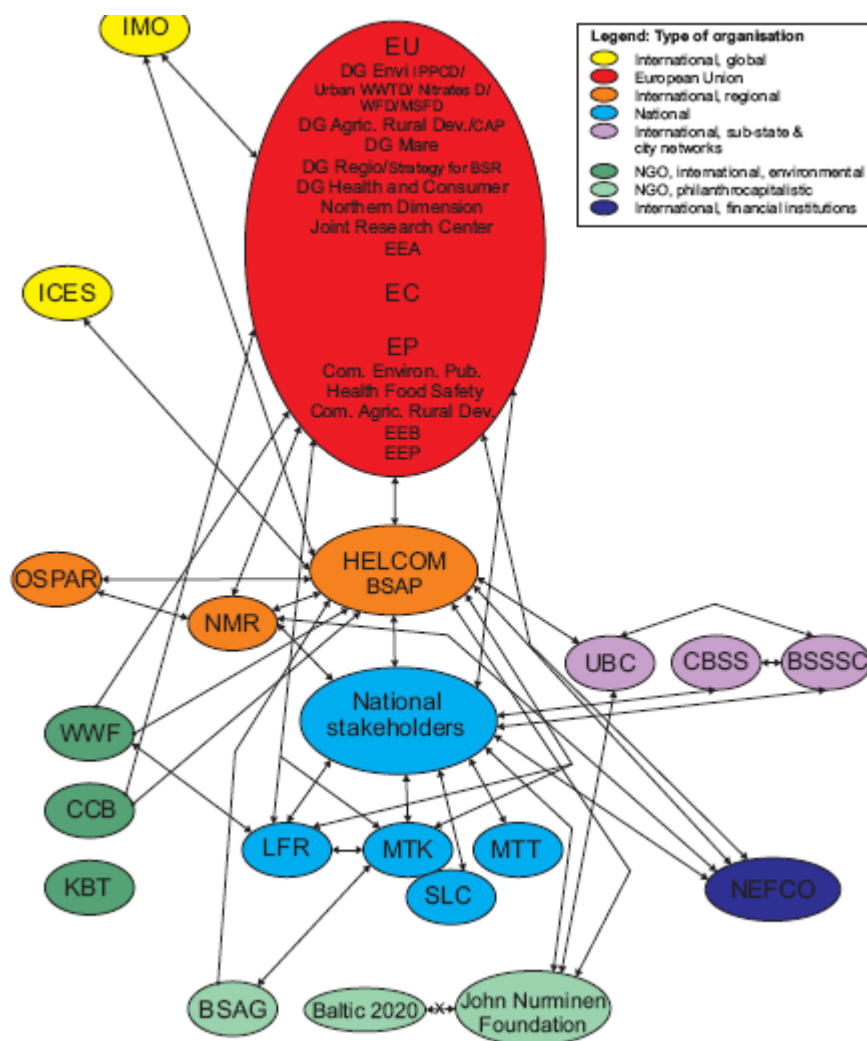


Figure 3.1. The connection of actors on different policy levels with eutrophication on their agendas. Double arrows shows a mutual cooperation, single arrow status of active trust or observation. This figure is based on information in Appendix 1.

The EU, together with the European Commission and the European Parliament, is also the most intricate actor in the Baltic Sea region. The Sixth Environment Action Programme (6th EAP) sets out the framework for the environmental policy of the EU for the period 2002-2012. The programme with priority areas and thematic strategies has the aim to modernise the environmental policy making within the union. The focus is an integrated approach and an effective implementation, *e.g.* MSFD within the marine environment thematic strategy (EC 2010a). The fact that EU is the only regulatory body outside the level of national governmental states with binding legal rules, even more strengthen its importance as an actor for a sustainable Baltic Sea region. On the other hand, EU is top-down ruled, making it harder for customised solutions on a regional basis (Interviews, *e.g.* Authority 5, Scientist 1, NGO 2). At least for the more “easy” questions, like waste water treatment, a membership in the EU is an advantage for the environmental issues, when the regulatory framework is the same for all member countries (Interview, Authority 1).

HELCOM recommendations are adopted unanimously by the contracting parties and taken into account in national legislations and environmental programs. However, they are not legally binding. All the new networks in the Baltic Sea region combining governmental members with non-governmental actors has also forced HELCOM to transform its framework toward a hybridisation (Joas *et al.* 2007). According to the interview with Scientist 1, ICES has escalated the concurrence with HELCOM, which has got a positive influence on the HELCOM work by forcing an opening to a broader perspective. Today both national lobbying organisations, such as LRF and MTK, and NGOs, such as WWF and CCB, have observer status in the work of HELCOM. The role of NGOs in organisations such as HELCOM has undergone an important attitude change, as Scientist 1 says in the interview: “NGOs have an important and successful role in driving the public options”. As Joas *et al.* (2007) mention, the shift from international and national government-based governance to broader transnational governance based on hybrid networks or other projects on a multiactor level has introduced market economy to the policy process. The competition among the different networks is high – both for funding and for issues on their agenda – which enrich the political arena in the Baltic Sea region, but also giving rise to overlapping between the networks (Joas *et al.* 2007). Overlapping and ineffectiveness are also negative aspects of the governance structures of the Baltic Sea region of today that most of the interviewed persons mention as problematic. Hence, there is a call for a well coordinated communication forum without negative concurrence among the Baltic Sea countries (Interview, Scientist 1).

3.3 Concerns for decision-making

The interviews accomplished in the case study of eutrophication show that one of the major concerns and problems in decision-making in the Baltic Sea Region is the present structure of EU’s Common Agricultural Policy (CAP), which sort under the DG for Agriculture and Rural Development. CAP was reformed in 2003, which decoupled subsidies with production. To ensure development of a sustainable agriculture, the reformed CAP contains links with other standards such as animal welfare, food safety and environmental conditions in agriculture. Meaning for example that the Nitrate Directive must be fulfilled and buffer strips along water courses must be established. If farmers fail to meet these standards, payments from CAP will be reduced. In this way CAP refers to the Polluter-Pays-Principle (PPP). Farmers have also the possibility to get paid for agri-environmental measures made voluntarily. Different measures are designated from national to local levels, depending on farming systems and environmental conditions. There is also a modulation in payments where big farms will have less direct payments in favor for the new rural

development policy (EC 2010e). The persons interviewed with positions and background from as well authorities, science, and NGOs mention the CAP as problematic. According to WWF, CAP with its focus on intensive agriculture is “out of date” (WWF 2010d). Therefore, the organisation demands a change in CAP with subsidies paid in relation to environmental measures (WWF 2010d). This opinion is also raised in the interviews with *e.g.* Authority 2 and 5, NGO 1 and 2. “CAP is part of the problem, not a solution” (Authority 5). “CAP needs a regionalisation and stronger requirements for *e.g.* fertilisers” (NGO 1).

4. WP 2: Governance processes I, Interactions between risk assessment and risk management

4.1. Introduction

In the regulation of eutrophication in the Baltic Sea, a highly complex natural phenomenon is facing a straightforwardly, exclusively science-based management regime, which is embedded in a broader international environmental governance framework of the Baltic Sea region. HELCOM, as the primary policy actor in both, the initiation of risk assessment activities as well as in the production of management proposals, was strongly influenced by the scientific community from the very beginning. In HELCOMs science-based policy regime, indicators have emerged as the key tools for ‘effect based’ management actions and the monitoring of their implementations (Backer 2008: 1398). The Baltic Sea Action Plan (BSAP), adopted in 2007, serves as a regional environmental policy for the Baltic Sea that relies heavily on scientific knowledge in form of indicators (Backer 2008). As a result, the HELCOM assessment system, implementing the Ecosystem Approach to Management with the BSAP, is based on a specific approach to define “good ecological status” shown in Figure 4.1. A ‘vision’ describes the overall ambition of HELCOM (a healthy Baltic Sea), ‘strategic goals’ define the issue of concern (*e.g.* a Baltic Sea unaffected by eutrophication) and the ‘ecological objectives’ describe the characteristics of what a healthy ecosystem means (*e.g.* clear water). The ‘indicators’ (*e.g.* specific water transparency) are finally used as quantitative proxies and ‘targets’ define the acceptable deviation from reference conditions set through historical observations modelling and expert judgements for a specific area (adopted from Backer/Leppänen 2007).



Figure 4.1. The HELCOM system of defining „good environmental status“ and how it is to be implemented through the BSAP (taken from Backer/Leppänen 2007).

So the system reveals that on the one hand, science has been strongly defining the political agenda, particularly HELCOM with regard to the regulation of eutrophication in the Baltic Sea. The activities of the scientific community on the other hand are also intensely driven by the requests from policy organisations, in particular by HELCOM (Interview Scientist 1). This chapter of our report will describe and analyse this entangled interplay between science and policy in the risk management of eutrophication in the Baltic Sea. The tight coupling between risk management and risk assessment can be seen as a central feature of the eutrophication regime in the Baltic Sea. It is principally based on a far-reaching agreement between the Baltic Sea states that only a harmonised approach of assessing the risk of eutrophication and subsequent concerted management options can make a positive contribution for collective action in this region.¹ Therefore the Baltic States performed an “integrated thematic assessment of the effects of nutrient enrichment” for eutrophication in the Baltic Sea region from 2001-2007, which is based on a multi-metric indicator based assessment tool called HEAT (HELCOM Eutrophication Assessment Tool; see HELCOM 2009; for a detailed description of HEAT see Andersen *et al.* 2010).

In the following section we explain the types of risk assessment carried out in the Baltic Sea region, particularly in connection with the HEAT tool. The reliance of these assessment activities on indicators that connect to specific management objectives put forward by HELCOM and the EU directives, requires however to start with briefly explaining how these policy instruments shape the overall assessment strategies. In the next sections we show how the assessment interacts with management activities (2.3), how complexities and scientific disagreements are handled (2.4) and how the Ecosystem Approach to Management is used in the regulation of eutrophication in the Baltic Sea.

¹ This is inscribed most clearly in the BSAP and the EU directives.

4.2. Assessment Activities: Methods, Principles and Tools linking to Management Objectives

4.2.1. Ecological objectives and the indicator-based assessment tool „HEAT“

The Baltic Sea Action Plan (BSAP), prepared by HELCOM, defines eutrophication as one of the four main issues to address in order to improve the ecosystem health of the Baltic Sea (HELCOM 2007). Nutrient enrichment leading to the large scale eutrophication within the last decades is seen as the most important single threat to the Baltic Sea (HELCOM 2009a; Andersen *et al.* 2010). The BSAP sets the overall goal “to have a Baltic Sea unaffected by eutrophication” (HELCOM 2007: 9), which is linked to a number of Ecological Objectives. These Ecological Objectives correspond to the principles of “good ecological status” in the European Water Framework Directive (WFD; Anon. 2000) respective “good environmental status” (GES) in the Marine Strategy Framework Directive (MSFD; Anon. 2008). HELCOMs vision for a good environmental status in the Baltic Sea unaffected by eutrophication is inscribed in the following **five ecological objectives** (HELCOM 2007: 9).

- 1) *Concentrations of nutrients close to natural levels,*
- 2) *Clear water,*
- 3) *Natural level of algal blooms,*
- 4) *Natural distribution and occurrence of plants and animals,*
- 5) *Natural oxygen levels.*

The aim of ‘clear water’ was chosen as the primary ecological objective in the BSAP with water transparency as the indicator, measured in summertime (June-September) ‘Secchi depth’ for different sub-basins of the Baltic Sea.² In the most recent assessment, the so-called HELCOM Eutrophication Assessment Tool (HEAT) was used to assess the eutrophication status in the entire Baltic Sea.³ It uses ‘**reference conditions**’, which are “... a description of the biological quality elements that exist, or would exist, at high status, that is, with no, or very minor disturbance from human activities” (Anon. 2000). In other words the ‘reference conditions’ serve as a flexible concept and should represent *natural variability* by using three operational principles: reference sites, historical data and modelling (Andersen *et al.* 2010: xx). They can be quantified for each parameter and relate to the above-mentioned ecological objectives, in particular **nutrient loads** (dissolved inorganic nitrogen and phosphorous; relating to objective 1); **water transparency**

² For exact measures of *Reference Values*; *Target Values* and *Present Situation* in the BSAP see Table 1 in HELCOM 2007: 78.

³ It builds on the OSPAR Common Procedure developed for the North Sea, the Channel and Skagerrak/ Kattegat (see OSPAR 2003; 2008).

(objective 2 of ‘clear water’ measured as ‘Secchi depth’) **chlorophyll-a concentrations** (objective 3) and **benthic invertebrates and submerged aquatic vegetation** (objective 4; cf. Andersen *et al.* 2010: xx).

In a next step, ‘**target levels**’ are set as an “acceptable difference” of the actual observed status from the ‘reference conditions’ using pre-defined ‘**acceptable deviation**’ values, which are set basin-wise for each of the indicators. ‘Acceptable deviations’ have an upper limit of +50 % deviation from ‘reference conditions’ (HELCOM 2009a; see also Andersen *et al.* 2010 for more detailed descriptions). This implies that low levels of disturbance (i.e. ‘no’, ‘minor’ or ‘slight’ deviation = less than +50%) are considered as “acceptable” while ‘moderate’ conditions (i.e. more than +50% deviation) are considered as “unacceptable” (see Figure 4.3 below).

With this approach, HEAT arrives at giving a general classification of eutrophication for a total of 189 areas over the entire Baltic Sea region distinguishing ‘areas affected by eutrophication’ from ‘areas not affected by eutrophication’ (see HELCOM 2009a,b,c). 17 of these are open water areas and 172 are costal areas (Figure 4.2). Most of the areas (179) are classified as ‘affected by eutrophication’; only two of the open water areas are classified as ‘areas not affected by eutrophication’ (Swedish parts of the north-eastern Kattegatt and Bothnian Bay). For coastal waters eleven areas are classified as ‘not affected by eutrophication’ while 161 as ‘affected by eutrophication’. The monitoring data for the assessment of the actual eutrophication status stem mainly from the so-called HELCOM Cooperative Monitoring in the Baltic Marine Environment Programme (HELCOM COMBINE; for measurements and analytical procedures see HELCOM 2008), the HELCOM Fifth Pollution Load Compilation (PLC-5; HELCOM 2010l) as well as from national research activities (e.g. Svendsen *et al.* 2005).

The actual assessment is based on an evaluation of the five ecological objectives/ quality elements and their connection to the specific indicators that are chosen to signify the eutrophication status in relation to the overall goal of the BSAP – a “Baltic Sea unaffected by eutrophication” (see Table 4.1). The Indicators have been agreed with the target values, which are intended to represent ‘Good environmental status’ when achieved (HELCOM 2009c; for explication see also Andersen *et al.* 2010). An Ecological Quality Ratio (EQR value) is assigned which relates to both the BSAP as well as to the EU’s WFD. This EQR “represents the relationship between the observed value of an ecological parameter in a water body and the value for that parameter in reference conditions

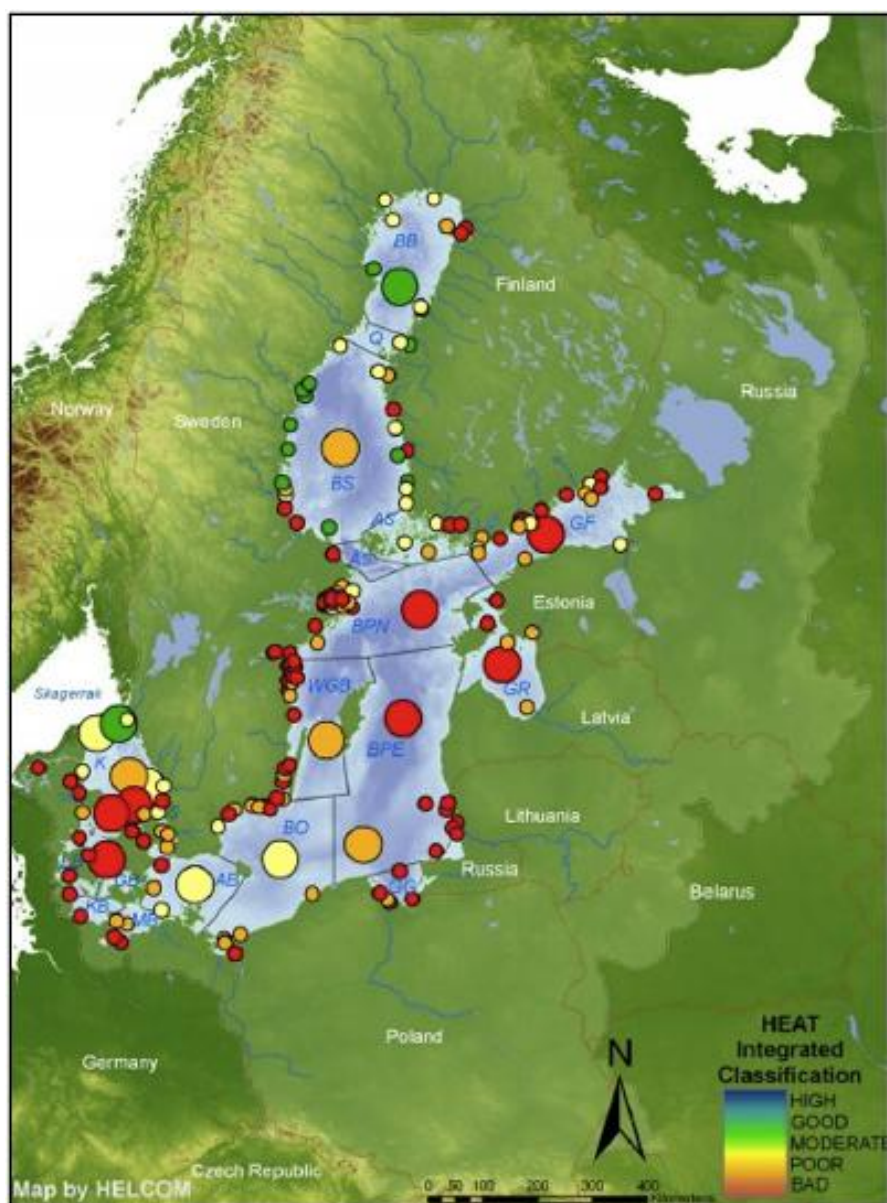


Figure 4.2. Results of the HEAT integrated assessment of eutrophication in the Baltic Sea (taken from HELCOM 2009c).

Ecological objective	Indicator
'Concentrations of nutrients close to natural levels'	Winter surface concentrations of nutrients
'Clear water'	Secchi depth
'Natural level of algal blooms'	Chlorophyll-a concentrations
'Natural distribution and occurrence of plants and animals'	Depth range of submerged aquatic vegetation
'Natural oxygen levels'	Abundance and structure of benthic invertebrate communities

Table 4.1. Objectives and adjacent indicators following the BSAP (taken from HELCOM 2009c).

applicable to that water body” (HELCOM 2009c: 19). It is expressed numerically between zero (worst) and one (best; see Figure 4.3). The “**eutrophication quality objective**” (or ‘target level’) is the result of the ‘reference condition’ \pm ‘acceptable deviation’ for a specific water body in question.

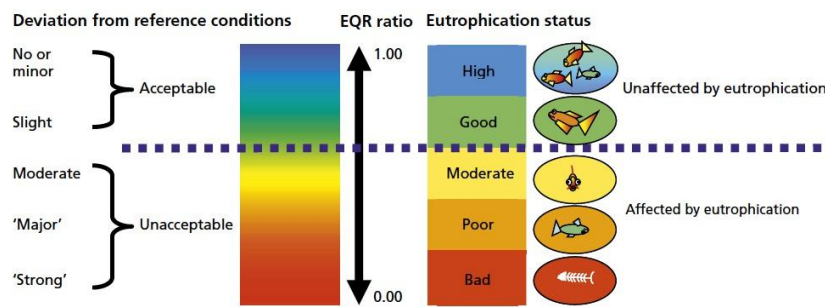


Figure 4.3. The eutrophication quality objective bridging the policy systems of the WFD (left side) and the BSAP (right side; taken from HELCOM 2009c).

It represents the boundary between “acceptable” or “unacceptable” conditions (sensu WFD) or “unaffected” or “affected” by eutrophication sensu the BSAP (dotted line in Figure 4.3). Figure 4.3 illustrates the key assessment concepts used in the HEAT tool and shows the relationship between the WFD principles (left side of the picture) and the BSAP (right side of the picture).

The results of the HEAT analysis are generally in line with previous assessments of eutrophication in the Baltic Sea (HELCOM 2002, 2006; Ærtebjerg *et al.* 2003; Rönnerberg & Bonsdorff 2004). Furthermore they can also be compared directly with national assessments and EU processes like the WFD implementation in the Baltic region but add more specific parameters like e.g. nutrients and ‘Secchi depth’ (cf. Andersen *et al.* 2010: xx). The HEAT results presented here with the new ‘reference condition’ values are therefore seen as representing the best available dataset for the area and should thus be used in regard to updating the BSAP, e.g. as done previously by Wulff *et al.* 2007 (ibid: xx).

According to the authors of the HEAT assessment, “there is no such thing as a perfect assessment tool” (Andersen *et al.* 2010: xx). However they see HEAT as a huge improvement compared to its equivalents like the OSPAR COMP on which it builds. The greatest advantage of HEAT is that it connects the ‘eutrophication status’ of the BSAP with the ‘ecological status’ sensu the WFD in a direct manner because “eutrophication” actually means “ecological” here since the largest threat for the Baltic Sea ecosystem is actually nutrient enrichment and eutrophication (ibid: xx). In providing a regional overview for eutrophication in the Baltic Sea, HEAT therefore gives a perspective to link the BSAP and the various EU directives (e.g. the WFD, MSFD, Nitrates Directive and Urban Wastewater Directive) for a synergistic convergence of aims and management objectives; (Andersen *et al.* 2010: xx).

4.2.2 The causes of eutrophication: nutrient inputs

The process of eutrophication is a result of excessive amounts of nutrients in the Baltic Sea mainly nitrogen (N) and phosphorus (P) causing growth of short-lived macro algae and phytoplankton resulting in various undesirable effects (*e.g.* sedimentation of organic matter to the seabed resulting in oxygen depletion and finally the loss of benthic animals and fish; for an overview on eutrophication in the Baltic Sea see Introduction to this report). The excess of nutrient concentrations originates from land, atmospheric inputs as well as from losses of phosphorus already buried in the sediment.

Nutrient concentrations have increased up until the 1980s and phosphorous concentrations have decreased since then except for the Gulf of Finland (HELCOM; 2009c). Nitrogen concentrations have also declined in the Gulf of Riga, the Baltic Proper and the Danish Straits, due to lower nutrient inputs from land. However the changes of water affected by hypoxia in the sediments also cause aversive effects in nutrient concentrations in the Baltic Proper, which also affects connected basins (*ibid*). Especially the Gulf of Finland has been severely affected by this kind of losses from the internal phosphorous loads in the sediment caused by hypoxic conditions (*cf.* Vahtera *et al.* 2007). According to HELCOM, management actions have shown results in some regions (Carstensen *et al.* 2006), reducing nutrient concentrations to a level of the 1970s while “further reduction measures are generally necessary” (HELCOM 2009c: 6).

Nutrients originate from various human activities *e.g.* from emissions to air, discharged from point sources along the coast (mainly industry and water treatment plants) or from diffuse input sources (mainly from agriculture) and finally arrive at the sea. The mayor natural removal pathways for nutrients are through permanent burial in the sediment, denitrification (only N) or export to the Skagerrak (HELCOM 2009c: 11). The mayor source for nitrogen stems from diffuse inputs (71% of the total load) with agriculture alone contributing with 80% to these loads. The largest phosphorus loads originate from point sources (56%) with municipalities as the main source (90% of the total point source discharges). About 75% of the nitrogen and at least 95% of the phosphorous arrives via rivers or as direct discharges to the Baltic Sea (*ibid*). There are large variations in the areas of inputs to the Baltic Sea, while only the Gulf of Bothnia has low loads of both nitrogen and phosphorus.

“Slight decreasing trends” have been witnessed in riverine and direct point source inputs of both nitrogen and phosphorous to the Baltic Sea between 1990 and 2006, which is seen as “confirming the fact that the measures taken to reduce the nutrient inputs are effective” (HELCOM 2009c: 11-

12). However there is a huge time lag between the actions taken and a positive response in the environment. Sophisticated modelling efforts have in recent years come a long way in preparing scientific advice to policy with regard to the magnitude of nutrient reductions required to reach the identified target levels in the Baltic Sea (*e.g.* Wulff *et al.* 2007; Savchuk/Wulff 2007). The first of these calculations were incorporated in the BSAP, which is partly based on an ecosystem based approach to management (EAM, for description and discussion see below; cf. Wulff *et al.* 2007; HELCOM 2007). The actual approaches to reduce nutrient inputs and the interactions between the assessment and modelling efforts on the one side and management on the other are described in the next section.

4.3 Risk assessment – risk management interactions

4.3.1 The generation and evaluation of management options: Nutrient inputs and strategies to reduce them

Although some nutrient reductions have been achieved in most of the Baltic Sea countries, the overall developments are not encouraging. Additional reductions are needed and should be driven by the implementation of the BSAP and the EU directives (WFD, MSFD, Nitrate Directive & Urban Waste Water Directive). Furthermore regular evaluations and reviews are needed to assess if and how it is feasible to meet the objectives set in the BSAP and the EU directives (cf. HELCOM 2009c: 13).

In the development of nutrient management strategies, it has been debated for some time whether reductions have to consider either nitrogen or phosphorous or both of the nutrients (Tamminen & Andersen 2007; cf. Andersen *et al.* 2010). More recently it became clear that both of the nutrients, nitrogen and phosphorus, are necessary for controlling eutrophication (Conley *et al.* 2009; interview scientist 3; for more details on this discussion see section 3.4 below).

Until the late 1980s the HELCOM recommendations for nutrient reduction followed an allocation scheme to implement **general 50%** reduction targets. A HELCOM Ministerial Declaration in 1988 still called for “a substantive reduction of the substance most harmful to the ecosystem of the Baltic Sea” ... “in the order of 50 % of the total discharges”, which included nutrients (besides heavy metals and toxic substances; HELCOM 1988). This goal was supposed to be reached “as soon as possible but no later than 1995” (*ibid.*). However, a Ministerial Meeting in 1998 concluded that despite serious efforts the 50% target has not been realizable and declared to intensify joint co-operative research projects, including the “application of models for decision support, evaluation of

effect-related critical loads and methods to follow up action taken” which should “contribute to a more effective environmental management framework for the restoration of the Baltic Sea” (HELCOM 1998).

Besides this awareness in policy circles, a number of studies since the 1990s have come to the conclusion that a uniform reduction policy is both unsuccessful and cost-ineffective (*e.g.* Gren *et al* 1997; Wulff *et al.* 2001; Neumann & Schernewski 2005). The management strategy of a general 50% reduction strategy has therefore been abandoned: “The notion that nutrient reductions should be equally and evenly distributed between member states is no longer valid, largely because science has shown that such measures would be extremely expensive and ineffective” (Wulff 2008). With the BSAP, the HELCOM member states approved this consideration and agreed on a new management strategy for nutrient reduction, which follows a model of the most **cost effective measures** to be undertaken in the different sub-regions of the Baltic Sea (*cf.* Wulff *et al.* 2007: 243). This new management strategy is based on a specific decision support system for the Baltic region called **NEST**, developed under the lead of the Baltic Nest Institute at Stockholm University (see below). In this new allocation scheme, permissible nutrient reductions got established between 25% and 50% as compared to the phosphorous and nitrogen loads that entered the sea in the late 1990s. The great challenge put on the scientists with this new policy strategy from HELCOM was “to calculate the quantity of nutrients, which should be removed to ensure good environmental conditions in all parts of the Baltic Sea, and also fairly allocate reduction quotas between the HELCOM member states” (Wulff 2008).

4.3.2 Interaction of Science and Management: the Baltic NEST - HELCOM nexus

With the BSAP the HELCOM member states agreed “on the principle of identifying maximum allowable inputs of nutrients in order to reach good environmental status of the Baltic Sea” and “that the needed reductions shall be fairly shared by all Baltic Sea countries” (HELCOM 2007: 8). On the basis of the NEST model, which is regarded as “the best available scientific information” but also understood as bearing “provisional character of the data”, the member states acknowledged that “the maximum nutrient input to the Baltic Sea that can be allowed and still reach good environmental status with regard to eutrophication is about 21,000 tonnes of phosphorus and 600,000 tonnes of nitrogen” (*ibid.*). Based on national data and information on nutrient inputs over the period 1997-2003 in each of the sub-areas of the Baltic Sea, the BSAP proposed a reduction scheme for the different sub-regions (Table 4.2) and the contracting parties agreed on concrete country-wise “provisional reduction requirements” (HELCOM 2007: 9; see Table 4.3).

Sub-region	Maximum allowable nutrient input (tonnes)		Inputs in 1997-2003 (normalised by hydrological factors)		Needed reductions	
	Phosphorus	Nitrogen	Phosphorus	Nitrogen	Phosphorus	Nitrogen
Bothnian Bay	2,580	51,440	2,580	51,440	0	0
Bothnian Sea	2,460	56,790	2,460	56,790	0	0
Gulf of Finland	4,860	106,680	6,860	112,680	2,000	6,000
Baltic Proper	6,750	233,250	19,250	327,260	12,500	94,000
Gulf of Riga	1,430	78,400	2,180	78,400	750	0
Danish straits	1,410	30,890	1,410	45,890	0	15,000
Kattegat	1,570	44,260	1,570	64,260	0	20,000
Total	21,060	601,720	36,310	736,720	15,250	135,000

Table 4.2. Nutrient reduction scheme for different sub-regions of the Baltic Sea in the BSAP (taken from HELCOM 2007).

	Phosphorus (tonnes)	Nitrogen (tonnes)
Denmark	16	17,210
Estonia	220	900
Finland	150	1,200
Germany	240	5,620
Latvia	300	2,560
Lithuania	880	11,750
Poland	8,760	62,400
Russia	2,500	6,970
Sweden	290	20,780
Transboundary Common pool	1,660	3,780

Table 4.3. Country-wise reduction requirements in the BSAP (taken from HELCOM 2007).

The basis for these specific reduction targets and their division among the countries, as inscribed in the BSAP, is given by scientific recommendations provided through the so-called MARE NEST model. MARE (Marine Research on Eutrophication) was an eight year research program funded by the Swedish Foundation for Strategic Environmental Research (MISTRA) involving ca. 30 scientists around the Baltic Sea (see Wulff *et al.* 2001). The idea behind the NEST decision support system was to “develop a user-friendly, computer-based decision support system and to introduce it to managers as a tool for identifying cost-effective strategies to counteract eutrophication of the Baltic Sea” (MARE 2007). The main target group for the NEST system are decision-makers in HELCOM, as well as in the Baltic Sea States working on the implementation of the EU’s WFD. It is intended to enable them to fulfil the goals of “A Baltic Sea unaffected by eutrophication” (BSAP) or “good ecological status” (WFD) by describing the relationship between the actual state of the

environment and the costs for achieving the desired ecological objectives (environmental target levels). The NEST model therefore couples information's on the state of the environment at different levels of nitrogen and phosphorus to the relationship between the loads of these nutrients (inputs + concentrations in the water) and finally to the costs for nutrient reductions from the most important sources of nutrient inputs (water- or airborne; see MARE 2007). The NEST decision support system finally arrived at an openly shared web-based tool to be used for testing cost effective strategies to reduce eutrophication in the Baltic Sea region (see: <http://nest.su.se/nest/>). Using the NEST decision support system, the Swedish branch of the Baltic NEST Institute (BNI)⁴ also developed the “country-wise nutrient reduction targets” adopted in the BSAP by HELCOM in 2007. This presents, according to BNI “a unique science-based method for dividing needed nutrient reductions between riparian countries and a milestone in the process of improving the Baltic Sea” (see: <http://www.balticnest.com/balticnest/balticnest/aboutnest>).

Since NEST was developed more or less exclusively for HELCOM and the EU water directive managers it can be seen as an extraordinary example of a tight relationship between assessment and management at this science-policy interface: One research project (MARE) resulted in a single model (NEST), used as *the only* basis for the whole eutrophication policy in the Baltic region via the ‘flagship project’ of the BSAP. This intense entanglement of a scientific assessment and its management implementation has actually been criticized for example by the Swedish Farmers Organisation (LRF), that „a completely new and previously untested model is used as the basis for a multi-million decision“(LRF 2010; own translation).⁵ Despite these few objections, even scientists involved in the project wonder about the overall silence about the fact that just one institute carried out all the calculations though they emphasise the fact that no other than BNI was able to do it at that time in 2007 (interview scientist 1). The tight interplay between of science and management within the NEST-HELCOM nexus is perhaps most apparent within the online tool of NEST model. This device can be run both in an “expert mode” and a “manager mode” – an intended duality to allow the goal that it is used both, as a tool in management and at the same time for scientist to

⁴ The Baltic Nest decision support system has been developed involving a range of 30 scientists around the Baltic Sea and used information provided by a number of institutions in the drainage area (see <http://nest.su.se/bed/ACKNOWLEDGE.shtml>).

⁵ Also the Swedish Ministry of Agriculture voiced some critique in this direction, e.g. that no socio-economic assessments are included in the NEST model, but overall there is surprisingly little controversy on the entwined NEST-HELCOM interaction (for an NGO opinion, see WWF/CCB 2010; and also WP 3 in this report).

transparently evaluate it.⁶ The close institutional entwining of science and management in the BSAP's eutrophication segment with the HELCOM-NEST nexus has in this sense been depicted as "...a unique example how research and politics can communicate in defining reduction targets for a marine environment" (Österblom/Wulff 2008, own translation). The endeavour that traditional academic scientist and policymakers had to communicate and develop a common product has been judged as overall successful, due to the goal of developing a common '*boundary object*' (Österblom et al. 2010: 1297) – the decision support tool NEST and to increase the general knowledge on consequences and treatment of negative impacts on eutrophication in the Baltic Sea (Johansson et al. 2007; interview scientist 1). Nonetheless this appreciation of a prosperous interaction between science and policy, the MARE-NEST project also exposed the difficulties and conflicts between the traditional academic science system and 'science for policy makers', i.e. it showed that it was difficult in particular for senior scientists to accept a more "consultant-like way to participate in a research program of this nature" (Johansson et al. 2007: 120).⁷ These communicative experiences in the HELCOM-NEST nexus present an interesting object of further investigation, linking to a broader research field that studies the difficulties and tensions between 'basic science', 'science-advice' and policy-making, as investigated for example in other domains of environmental issues such as fisheries management (Wilson 2009).

The decision support system NEST continues to be developed further by the BNI in cooperation with researchers from various countries around the Baltic, the Swedish part being financed by the Swedish Environmental Protection Agency. The work on management strategies for nutrient reductions in the Baltic Sea also continues beyond the BSAP with National Implementation Plans (NIPs), as presented e.g. by the Swedish Ministry for the Environment (2010). The HELCOM member countries presented their NIPs on how to fulfil the BSAP at the Moscow Ministerial meeting on 20 May 2010. At this meeting it was however not possible to evaluate the NIPs against the requirements set in the BSAP, while it was agreed that such an assessment "shall be presented at a high level segment during the HELCOM meeting in March 2011" (HELCOM 2010k). The media also saw the meeting some extent as a disappointment because many of the member states' implementation plans were incomplete. The plans were supposed to be submitted before the meeting, so that they could be evaluated at the Moscow meeting, but in many cases they were not (DN, 2010). As agreed already in the BSAP, the NIPs should be evaluated with regard to the

⁶ See <http://www.balticnest.com/balticnest/balticnest/aboutnest.4.aeea46911a3127427980005979.html>.

⁷ Such difficulties of communicating between scientists and policy-makers/ politicians have also been discussed at the HELCOM Ministerial Meeting in Stockholm 25. August 2010.

effectiveness of the programmes at a HELCOM Ministerial Meeting in 2013 and whether additional measures are needed either on a national, HELCOM or global level (ibid).⁸ The discussion about the successful implementation of the BSAP's nutrient reduction agreements, particular in relation to its cost-effectiveness and also fairness is an ongoing process (*e.g.* COWI 2007, Gren 2008a). In this connection it has been proposed to introduce a nutrient trading system similar to the mechanisms of the Kyoto protocol's carbon dioxide trading market (Gren 2008b; interview scientist 1). This could be an “attempt to meet targets of cost effectiveness and fairness” and “increase the probability of successful implementation of the agreement, and thereby avoiding the same undesirable outcome as that of the ministerial agreement in 1988” (Gren 2008b).

4.4 Environmental complexities, scientific disagreements and management approaches dealing with it

As described above, the risk of eutrophication in the Baltic Sea is a extremely complex field with regard to the scientific assessments and the understandings of actual processes impacting on the ecosystem. Beside this complexity in ecosystem functioning we face a highly diverse political arena to manage and control eutrophication in the densely populated region of the Baltic Sea drainage system. The nine bordering states around the Baltic Sea are all HELCOM members while additional states like Belarus and Ukraine, which as non-HELCOM member states also contribute intensively to the nutrient inputs into the Baltic Sea. Except Russia all the bordering states are members of the European Union thus falling under the legislation of the EU directives.

While for a period toxic substances have been regarded as the major threat to the Baltic, today eutrophication and fisheries are seen as the most urgent problems. The most evident environmental risks for the Baltic Sea today (*e.g.* fisheries, eutrophication and biodiversity) cannot – and should not anymore – be understood and managed independent of each other. Enormous changes have occurred in the food web of the Baltic Sea ecosystem over the last century, which are “partly due to eutrophication, partly due to new species coming into this young sea and partly due to fisheries” (interview scientist 1). Climate change is another factor impacting on rapid changes in the ecosystem, leading eventually to even more increased eutrophication as calculated in the models described above. During the last decade, these various changes have resulted in “synchronous

⁸ For this, the following activities should been taken with regard to the eutrophication segment (cf. HELCOM 2010bxx): HELCOM' BALTHAZAR, TARGREV, COMPASS, CORESET and PURE projects (see Annex to this report); the EU Strategy for the Baltic Sea Region; activities supported by the NIB/NEFCO administered BSAP fund and - specifically for EU Member States the implementation of the MSFD in the Baltic Sea.

regime shifts” in the Baltic Sea ecosystem (substantial changes in species composition in the overall ecosystem structure) as responses to climate change, nutrients and fisheries (cf. Blenckner *et al.* 2009). Such changes result in so-called “trophic cascading effects”, which means the decrease of secondary species driven by the reduction of top-predators in an ecosystem. Recent research has shown such cascading effects for the Baltic Sea induced by the heavy fishing pressure on cod (Casini *et al.* 2008; 2009). As these studies point out, “large decrease of the cod population has cascaded down the food web influencing the whole open Baltic Sea ecosystem, from planktivorous fish to primary producers” (Casini *et al.* 2008: 1799). The researchers therefore conclude that in order to dampen the problem of eutrophication like the summer algal blooms “effort should be made not only to control anthropogenic nutrient inputs but also to prevent large changes at the higher levels of the food web” (ibid). A key question regards the actual possibilities of reversing these observed trends e.g. with recovery programs for top-predators like cod.⁹ It has been shown that this is not an easy task because additional effects in the ecosystem structure complicate the process. For example the zooplanktivorous cod larvae compete with the high sprat populations for food – which can undermine both cod and ecosystem recovery (ibid). In other words and with regard to the problem of eutrophication, a more “decent fisheries management” could rather rapidly increase the quality (clarity) of the water in the Baltic Sea – achieved through less predation on zooplankton (through more predation on the zooplanktivorous species sprat and herring by larger cod populations) and thus more predation on phytoplankton. The idea that ecosystems can be reverted to their original conditions by suppressing human impacts might however build on an illusion, as for example Duarte *et al.* (2009) discuss in their article “Return to *Neverland*” following the analogy to J.M. Barries’ novel “Peter Pan”.¹⁰ By testing four coastal ecosystems, these authors show that the trajectories of these ecosystems were not reversible resulting from “shifting baselines” in the ecosystem, i.e. from “broad changes in environmental conditions, all affecting ecosystem dynamics, that occurred over the 30 years spanning from the onset of eutrophication to the reduction of nutrient levels” (Duarte *et al.* 2009: 29).

These studies emphasize the importance of preserving the structures of ecosystem and their dynamic functioning and call for the need to link food web dynamics and ecosystem resilience (cf. Carpenter & Folke 2006). Given the huge amount of nutrients already existent in the Baltic Sea, the

⁹ As done in pilot projects e.g. at Himmerfjärden (release of pikeperch, a project lead by Sture Hansson, see www.balticsea2020.org) or the project of catching massive sprat in the Kalmarund by the Swedish board of fisheries (search for „skarpillprojektet“ at www.fiskeriverket.se).

¹⁰ In this children’s play, Pan and Wendy created an island called *Neverland*, where everything remained perceptually unchanged.

actual difficulties to reduce nutrient inputs and the long time delays between current efforts and actual signs of improvement in the environment, the consideration of fisheries impacts on eutrophication might be highly relevant. As one scientist in our interview study puts this: “we can say that even if you were managing to implement the BSAP tomorrow, it will take 30-50 years. But if you really made effort to restore the cod population you could do it in five years. A decent fish management could solve, not all, but some of the problems. It will not change the amount of nutrients but it could improve the water clarity...” (Interview with Scientist 1).

Besides nutrient inputs and fisheries, habitat changes, induced for example by destructive fishing methods like bottom trawling might also have severe impact on the ecosystem particularly for bottom feeders like cod, but are in general far more difficult to control in the marine habitat than on land (interview scientist 3). Although there is an overall consensus that nutrient reduction – before they enter the Sea – is the only preferable long-term strategy to combat eutrophication in the Baltic Sea, a number of (heavily funded) studies on alternative methods (engineering approaches) have investigated possible technical solutions to reduce eutrophication in the Baltic Sea (Conley 2010). Among these are ideas to artificially oxygenate the Baltic Sea or change the saltwater inflow (discussed in Conley *et al.* 2009a), ventilate the bottom waters by mixing deep-water levels with huge engine devices or use phosphorous sequestration to enhance the permanent burial of phosphorous in the sediments by precipitation with aluminium or other compounds. All these methods are regarded as currently unfeasible and not possible for a number of reasons – of ethical (reversibility), legal, financial and technical nature (Conley 2010). Another vision to reduce nutrients directly from the Baltic Sea is through mussel farming as a way to absorb nutrients. A variety of projects are currently investigating this method, funded e.g. by the Baltic 2020 foundation, which has initiated five projects in 2008-2009 dealing with these issues (*e.g.* Minnhagen & Lindahl 2010) or the Baltic Sea Action Group, (BSAG), which launched a pilot project for large-scale mussel farms in Åland (see Appendix to this report). A number of problems make expert judgements on this technique highly sceptical: first of all mussels in the Baltic’s brackish water grow too slow to have a quantitative effect on nutrients, “you essentially have to cover every inch of all coastal areas with mussel farms and that is not feasible” (Interview Scientist 1). But also other effects like the protein extraction from the sea has not been considered thoroughly as well as its interference with recreational activities, besides it being too costly for broad based application compared to the land-based reductions (Interview Scientists 1 & 3; Authority 2).

The evaluations of these considerations both, of the impacts on the risk of eutrophication as well as of the ways how to counteract it, come back to one major management strategy – to reduce nutrient inflows into the Baltic via land based measures. In the scientific community there has been a controversy whether nutrient management should focus on nitrogen, phosphorous or both of these nutrients. The question was thought to be decided with findings from manipulated lakes in an Experimental Lake Area in Canada concluding that “rapid abatement of eutrophication may be expected to follow phosphorus control measures” (Schindler 1974: 897). These and other findings resulted in widespread reduction strategies in North American and European lakes with considerable success, while the broader goals were not achieved, particularly in estuaries and coastal marine ecosystems (Conley *et al.* 2009b), which finally lead to the recognition of the need to control also nitrogen (cf. Howarth & Marino 2006). Apart from a few diverging voices (e.g. interview scientist 2) there is an overall consensus within the scientific community that, at least for marine ecosystems like the Baltic Sea, it is necessary to control both nutrients, nitrogen and phosphorus.

In concluding this section it can be said that an overall consensus exists, both with regard to the risk (problem)¹¹ of eutrophication as well as how to deal with it, namely that the strategy to reduce nutrient inflows to the Baltic Sea should be prioritised. The tight interplay between the scientific assessments and management activities presented above, realised by a handful of people, made it possible to translate science more or less directly into political action and management. One should not forget that the eutrophication regime in the Baltic Sea is a very recent domain of international environmental governance (in particular the generation of the BSAP, its objectives and national implementation plans). Future developments will have to show how the so far widely neglected role of scientific uncertainty may play out and affect political action and decision-making. At present, the issue how to deal with uncertainties does not seem to be resolved within the regulatory framework for eutrophication in the Baltic Sea, thus an repetitive call for including uncertainties into the assessments like it has been done e.g. in the IPCC:

Climate researchers are much more used to work with uncertainties. They also stress that they work with scenarios, not predictions. I think it is very important to make this distinction, that you can set scenarios. You can use the uncertainties in these ensembles that there are many more people involved and that is also very important, that there are a number independent institutions that do these studies. (Interview Scientist 1)

¹¹ The „risk“ concept was highly difficult to understand for most of the interviewees in our study, so we used „problem“ instead for explications.

The latter point of this concern shall be met in the future, with more institutes participating with their own models and assessments for determining management strategies for eutrophication in the Baltic Sea – again analogous to what happened in the climate assessments: “The IPPPC is based on a number of independent institutes, and that increase the credibility, if there is a consensus. And they are different but the important thing is if they are showing the same trend.” (Scientist 1)

4.5 The Ecosystem Approach to Management and the role of science

The idea of an Ecosystem Approach to Management, also referred to as the *Ecosystem-Based Approach to Management* (EAM/EBAM), is not a novelty, neither in fisheries nor other domains of marine management (Garcia & Cochrane 2005; Backer *et al.* 2010). However it gained momentum in various marine governance frameworks over the last years (cf. Österblom *et al.* 2010). The idea of the EAM is rooted, similar to those of *Marine Protected Areas* (MPAs), in the recognition “that the value (to humanity) of the whole ecosystem is much greater than the sum of its parts” (Browman & Stergiou 2004: 269). It has been defined most clearly by the 12 “Malawi Principles” from the *Convention of Biological Diversity* (CBD 1998) and is similar to the concept of ‘adaptive co-management’ entailing that the scales of management need to be matched to the relevant ecological- and social scales (Österblom *et al.* 2010: 1290). Hence the EAM attempts to consider entire ecosystems, including humans and their activities, in an integrated manner, aiming “to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need” (Seaborne 2010: 11). In other words the EAM tries to take into account the complexities of entire ecosystems, recognising the full array of (species) interactions within the system – including humans, rather than considering single issues, species or any ecosystem services in isolation (Christensen *et al.* 1996, McLeod *et al.* 2005). The “EAM of human activities” has been adapted by HELCOM (2003) and in a joint Ministerial meeting from HELCOM and OSPAR (2003) as a basis for the work conducted through HELCOM. It commits the contracting parties to develop and implement the EAM by 2010. This includes the application of the ecological objectives and their adjacent indicators for ‘good ecological’ respective ‘good environmental’ status *sensu* the EU directives (see above) for the entire Baltic Sea area (Backer & Leppänen 2008: 323). The BSAP presents a first practical implementation of HELCOM’s commitment to the EAM, thus being called “a pilot action under the emerging European framework legislation on the marine environment” (*ibid.*: 324; see also Backer *et al.* 2010). The “objective-indicator-target” system, described above under 2.2, can in this connection be seen as a preparatory step in moving towards the core of the ecosystem approach of targeted management actions (*ibid.*: 330).

As noted above the concept of an Ecosystem Approach is “partly a new expression of an old idea; that of basing management of human activities in systems thinking [...] in order to attain environmental sustainability” (Backer *et al.* 2010; cf. Waltner-Toews *et al.*, 2008). Also the scientists in our interview study framed the EAM as not a new idea in itself but as a new concept and an important buzzword that improves the work of HELCOM:

I have worked with the ecosystem approach all my life. It is new in management; it is a buzzword in management. [...] Now they [HELCOM] have adapted the EAM and it enables a better work with them.

For the ecologists working with eutrophication in the Baltic, the EAM is rather an old hat, which has determined their whole academic work. Most of them however highly appreciate and welcome this new concept and connected shifts in thinking with the EAM within the management community. Nevertheless they also jointly express concerns about the understating of the EAM concept and its practicability outside the academic community, i.e. referring to it as a “meta concept not used in practice” (interview scientist 4): “It has taken a lot of time to get to an EAM now at least in thinking, and hopefully such holistic views will become implemented also fully” (scientist 3). Although many scientists have the impression that the EAM is not really understood correctly, the new ‘buzzword’ still serves an important function and makes people aware of the need to think more integrative, as one scientist puts this:

For me it is obvious, I mean what’s new? But what is new is that it has become a buzzword among managers but they have not really understand, it’s like many buzzwords like that, you pick it up because it’s self convenient. You talk about sustainable, environmental development and things like that, but for most people it sounds good but they don’t really know what it means.

I think it is good becoming a buzzword and it’s coming because we need an integrated assessment every bone fixed together in that sense in order. (Interview Scientist 1)

There is another, perhaps even more essential function that the EAM might serve – namely to work as a communication facilitator between science, policy and management, a task that also for scientist implies to think more “outside the box“. Following the statements in our interviews, this seems to be a growing awareness among many marine ecologists:

When people have a more ecosystem based approach then it is much easier to communicate. When people are just experts and have a little focus, then it is more difficult to communicate actually. But this is a problem also in science of course, in every aspect. We want to be a specialist in something. In proper EAM you have to link this expertise knowledge of different pieces and as you realize that there are limits to how far we as natural scientists can go.

We are joking as marine scientists there was a meeting earlier in our group people sitting there and said: we are marine scientists, why should we learn how much shit a pig produce that is not our deal! And I mean we spent a considerable time talking about agriculture policy, but I mean I am a marine scientist, that is a part of the Ecosystem approach too. (Interview Scientist 1)

As the quotes indicate, the EAM did not mean any changes in the “daily scientists work”, but is seen as bearing an important function as a new kind of ‘boundary object’ that enables different stakeholders to better communicate with each other as a scientist self-reflectively says:

I have to learn things too, I have to learn when I talk to HELCOM I have to use another language, another power-point presentation then when I talk to fellow scientists. But it wasn't a change in the daily scientist work. (Scientist 1, see also WP 3 for this issue)

Concluding the experiences with the EAM in regard to eutrophication, as mentioned by the different stakeholders in our interview study, we are left with a slightly ambiguous picture. On the one hand, the EAM is seen as a new and promising concept for management and in particular for the communication between scientists and policy-makers. On the other hand we face some hesitation concerning the practical use of it and voices that advocate to not giving up the single-issue approaches: “There's a threat that it will be too complicated, so we must try to find as simple ways as possible. And that's why I would like also to have these sector-wise targets” (Scientist 5).¹² Another contradiction that becomes apparent with the EAM in the regulation of eutrophication in the Baltic is the close relationship between science and management described above as the HELCOM-NEST nexus. Other stakeholders apart from science and policy-making seem to have been more or less completely absent in the development of the eutrophication management regime. For many this is seen as a potentially major obstacle for future developments in this domain, i.e. that the exclusive science-policy interplay between the Baltic Nest Institute and HELCOM bears a potential risk for the credibility of science, since at present it does not allow the inclusion of any other scientific or non-scientific knowledge or opinions into the decision-making process (see also WP 3 on Stakeholder Communication on this issue).

¹² This has been suggested similarly for fisheries: „We need to develop ecosystem-based approaches to fisheries that build upon and integrate ‘traditional’ single-species objectives, not solutions that abandon traditional approaches that have never been fully implemented, in favour of what are often ill-defined concepts that may do little to solve the overall problems and may not be operational“ (P.M. Mace in Browman/Stergiou 2004: 291).

4.6 Conclusion: The role of science in regulating eutrophication in the Baltic Sea

This chapter showed the paramount importance of science in the regulation regimes for eutrophication in the Baltic Sea. The major governance frameworks like HELCOM's BSAP and the EU directives rely almost exclusively on scientific knowledge in the form of indicators to define their management objectives like 'good ecological/environmental statuses. The scientifically defined indicators (*e.g.* Secchi depth) then serve tools to draft effect-based management actions for implementing the objectives of the management plan (*e.g.* clear water) via a well-structured policy system. This "objective-indicator-target" system has been described as a "preparatory step" towards an ecosystem approach based on target management actions (Backer & Leppänen 2007). These are in turn linked to actual human pressures via ecosystem models provided by science (*e.g.* Savchuk & Wulff 2007; Wulff *et al.* 2007 for an illustration of the whole system see Figure 4.4).

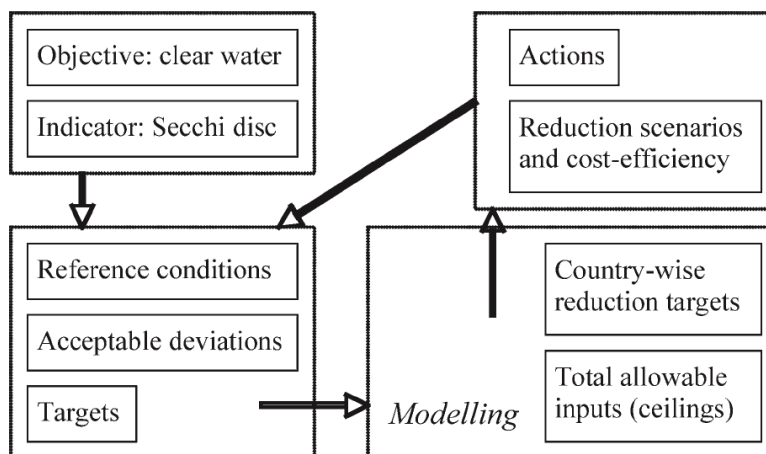


Figure 4.4. The use of indicators in the BSAP policy system exemplified with the objective 'clear water' (taken from Backer 2008).

Based on document analyses, literature reviews and an in-depth interview study, we found a general consensus among and within the stakeholder groups concerned with eutrophication in the Baltic Sea. The consensus regards both the actual risks connected with eutrophication, the problems related to the phenomenon (summer algal blooms, hypoxia), as well as the major sources (nutrient inputs) and appropriate management structures to combat eutrophication in the Baltic Sea (reducing nutrient inflows).

The management regime of eutrophication in the Baltic Sea, in particular with the above described HELCOM-NEST nexus can therefore be regarded as a typical example of a "co-production of science and policy" (Jasanoff 2004) in the field environmental governance (for a discussion of co-

production in HELCOM see Aps *et al.* 2010). HELCOMs history and in particular the development of the BSAP with its ecological objectives demonstrates in a perhaps unique way, how scientific knowledge claims underpin the legitimacy of political claims for the need of an regional environmental action program for the Baltic Sea. In this sense, the HELCOM-NEST nexus has created what Aps *et al.* describe as “a successful division and co-ordination of work between science and policy providing a forum which simultaneously co-produced a scientific knowledge framework and a framework for policy making” (Aps *et al.* 2010: 196).

The rather uncomplicated relationship between science and management in the regulation of eutrophication might seem surprising when compared to other environmental risks like e.g. fisheries, where the inclusion of other stakeholders like industry and NGOs and their knowledge is an important issue and complicates the whole policy process (Linke *et al.* forthcoming). The smooth cooperation between scientific assessment and policy-making suggests to ask whether this has to be understood as a reason for or a result of the almost entire exclusion of other stakeholders. In the light of this exceptional interplay between science and management and the overall consensus it might not seem surprising that so far no real specific mechanism for dealing with scientific uncertainty exists in the eutrophication policy of the BSAP (*e.g.* Interview Authority 5).

Notwithstanding the overall consensus, a few issues of disagreements have been discussed in this chapter, like the question whether nitrogen or phosphorous s the major factor in need to be reduced, or the minor disagreements whether large scale engineering could work to combat signs of eutrophication in the Baltic Sea or not. Also mussel farming is seen with divergent views; while some are in favour of this method to reduce nutrient loads directly in the sea, especially in coastal areas others don't believe that that this might work for the Baltic. Also the time perspectives are seen with concerns, while the aim of having a Baltic Sea unaffected by eutrophication already in 2021, as the BSAP states it, is regarded as an important strategic management goal, especially the scientific community sees this as totally unfeasible.

Besides the paramount role of science in defining both the issues of environmental risks as well as the appropriate management strategies for dealing with eutrophication in the Baltic Sea, there seems to be a growing awareness both among scientists and other stakeholders that science cannot answer all the questions and that the current system is highly unsophisticated in this regard because it is basically missing any form of substantial stakeholder involvement or even a thorough assessments of the socio-economic consequences per se (*e.g.* Scientists 1, 3; Authority 6). While the assessment

of the complex ecosystem interactions resulting to eutrophication is trying to encompass information on various spatial and temporal scales, the “quantification of good ecological status is in itself is a major challenge for conventional science” (Backer & Leppänen 2007; see also Funtowicz/Ravetz 1993; Lubchenco 1998). The value and interest laden character of environmental issues like eutrophication in the Baltic Sea “implies that these issues cannot be captured by any unambiguous scientific set of facts” (Pihlajamäki & Tynkkynen forthcoming).¹³ The definition and interpretation of “how good is good” however cannot be answered by science but is related to human values and worldviews (Mee *et al.* 2008),¹⁴ as one scientist in our study expressed it:

But there is one issue that has been discussed very little: what is a good Baltic Sea, what is a good environment? [...] That is a society question not science.

5. WP 3: Governance Processes II, Stakeholder communication

Work packages 3 aims to see how the eutrophication is framed as a risk in the Baltic Sea and how the communication of the problem is structuring the governance processes at different levels.

5.1 Framing of eutrophication

The way a problem is framed in different levels of organisations is useful for the analysis how the common understanding is developed and how the situation is tackled. On science basis eutrophication is regarded as an expansive process in coastal ecosystems, especially since the last part of the 20th century (*e.g.* Nixon 1995, 2009). The deteriorating health of ecosystems has been given more and more attention in a socio-economic perspective (Lundberg 2005b). By highlighting the distinct linkages between the environmental problems and society, the awareness by the general public arouses. The role of research is to provide society and authorities with solutions, cost effective measures and predictions for the environmental situation and how it will change. However, there are always uncertainties coupled with predictions. The decision-makers have to rely on the best educated guesses of the experts (Elliott 2002). For an ecosystem to be sustainable, it is

¹³ These authors argue for a more increased involvement of stakeholders in eutrophication: „... if taken as a starting point the fact that (even) scientific knowledge is multidimensional and society bound, thus unable to offer absolute truths and solutions, the position of so called “laypersons” and their expertise—the experience and knowledge of those stakeholders that are involved, for example farmers or those who suffer from eutrophicated waters most—becomes more significant for Baltic Sea risk governance” (*ibid.*).

¹⁴ Issues like these are also taken up by the BalticSTERN project including cost benefits analyses on questions like *e.g.* How much is the Baltic Sea worth to the people around it? How long we can wait (what is lost if no actions are taken)? See <http://www.stockholmresilience.org/balticstern>.

dependent on how management is run and how political decisions are made. To achieve a general understanding of a complex issue, the scientific community working in detail must meet the holistic approach of the managers (Elliott 2002). The aim of science is to serve society. Communication problems form the largest obstacles in the cooperation between scientists and decision-makers. Common failures are the use of different standards, lack of available information and difficulties in quantifying uncertain data (Kinzig & Starrett 2003). Therefore, the demand for an active interdisciplinary communication between different disciplines of science and between science and management is important (Walters 1997).

There is a clear view of the state of eutrophication in the Baltic Sea, where the situation is framed as an environmental problem, not a risk. The overall view is that eutrophication together with overfishing are the main threat to the ecosystem services in the Baltic Sea (HELCOM 2010j). As Authority 5 says: “Eutrophication is mainly an environmental problem, but it has serious socio-economic implications because it’s starting to affect the quality of water and therefore also a lot of human activities. It affect fishing, it affect tourism and a lot of other things so it definitively has a huge economic impact and it is becoming a more and more serious problem for society” (Authority 5). Or by using the words of Authority 3: “Well I guess it’s a problem already, as we see it, for the fisheries, that you have changes in composition of fish populations. It’s a problem recreationalwise but we also have very big cruising business in the Baltic. So I think that it’s affecting on a lot of socio-economic activities” (Authority 3). There are also some interviewees that mention the connecting role that eutrophication has for the Baltic Sea and the countries around it. The cooperation is built on framing of problems. “It changes the ecosystem totally and partly has already and that’s the main problem which then has also economic effects of course in the long run. You may though also political because I see the Baltic Sea is connecting us” (NGO 2). Among the interviews, only one person chose the statement that the eutrophication is not a problem for the Baltic and see high nutrient levels as positive, *e.g.* for the fish stocks (Interview with Scientist 2).

5.2 Causes and responsibility

Since the environmental risk of eutrophication in the Baltic Sea is recognized by almost everybody as a problem that is already there, the opinion of what causes the problem and who is responsible to act is more divergent and complex. “Eutrophication is a major problem and it’s a problem of a very specific character and also because it’s not so easy to find a fast fix for this problem and a fast

solution either. We have a problem with many stakeholders and many different sectors contributing to the problem so it's very, very complex" (Interview with Authority 5).

The point sources, as wastewater treatment, are technical and economical issues and the general view is that this part of the problem can be fixed if only the financial questions are under control. "Sewage treatment plants is just money, you don't have to change your lifestyle, it's easy to finance" (Interview with Scientist 1). Improvements in regulations are also seen as an option to solve the problem with point sources. "There the problem is obvious that the Urban Wastewater Treatment Directive, it's off course for the general EU level, addressing all the countries the same and it sets the certain phosphorus load that is acceptable from the treated wastewater and it's not enough for the Baltic Sea, because we know the Baltic Sea is a really unique and sensitive marine ecosystem. So in that sense the EU doesn't require enough from the municipalities" (Interview with Authority 1). Despite the criticism of the regulations in waste water treatment, it is reflected that the enlargement of the EU has made a positive contribution to reduce the nutrient load to the Baltic Sea, especially the Urban Waste Water Treatment Directive.

The diffuse sources are a much more complicated and complex issue. According to HELCOM (2010j), the diffuse sources stand for 39 % of the nitrogen input and 48 % of the phosphorus input to the Baltic Sea. About 80 % of this comes from agricultural run offs (HELCOM 2010j). The agricultural sector is also by several of the interviewees pointed out as a sector that should take a larger responsibility. "...we always say that agriculture sector comes away too easy because everything should be voluntary and it should even be paid for" (NGO 2). Who and how the responsibility should be divided give rise to divergent opinions, where some interviewees states that agriculture should be treated like any other industry and the polluter pays principle is to be used. "Personally I think that agriculture and fisheries must be considered as industrial activities, not lot of tax extension, heavy subsidies and so on. I think that is the clue" (Interview with Scientist 1). "For example there is this general accepted principle that the polluter pay so that is of course one important principle. And that we apply for the industry and municipalities for example, but we do not apply it in agriculture. In agriculture it's the opposite, the state pays the farmers for not polluting and that is a little bit strange" (Authority 5). On the other hand no one is blaming the individual farmer. Instead the agricultural policy and regulations are by some interviewees seen as the drivers towards a more intensive agriculture. The fear has risen since Poland and the Baltic states have become members of the EU. "... but there is a threat, a general threat you could say, that

agriculture will go the way as it had done in Denmark” (Scientist 1). “...the eutrophication that comes from agriculture that is the ministries who are in response for the EU, or these Water Framework Directives, Nitrate Directives and everything, so they are in the big response...” (NGO 4). “I think it’s the institutional setting that needs to change. ...because as we know the agricultural policy and environmental policy of the European Union are in complete conflict with each other” (NGO 3). A more intensive agriculture are not seen by all as a threat and there are also a understanding that regulations cannot solve all the problems with nutrient loads coming from agriculture since every individual farm is different from another and regulations already today can be difficult to follow and are in some cases not applicable (Authority 6, NGO 4). Some interviewees reflect a deeper insight that it in the end is up to the consumer to choose and that the price for food is too cheap today. “So I think that also the consumers should be more responsible about this thing and they should really think what they buy and what they eat, I think that consumers have gone too easily with this” (NGO 4). “In the end, food stuff must be more expensive, because we always say that buyers’ activities should be paying for the environmental effect they are doing and it would be reflected in the cost for the product” (Interview with Scientist 1).

5.3. Institutional communication of the eutrophication

5.3.1 Communication by and between authorities

In the area of communication at the authority level, HELCOM and the Baltic Sea Action Plan are seen as the main players by many interviewees, here illustrated by one NGO: “The European Commission is very much depending on HELCOM because it is the best area, the best area for everything” (Interview with NGO 2) and also by a scientist saying: “And then HELCOM’s role is very important because it concerns also Russia. I see HELCOM’s role in a way like a tool for EU” (Interview with Scientist 5). This is also recognised by the fact that the EU Strategy for the Baltic Sea Region states that HELCOM’s BSAP has a key role for the implementation of the Strategy and the environment objectives (EC 2009b) and as Authority 1 expresses in the interview: “The latest development within the EU framework with the EU strategy for the Baltic Sea region, that has been an enormous impetus and support to the HELCOM work ... there is also now an additional manoeuvring space that says you have to do what is needed within the region together with non-EU member states. And that’s where I see a tremendous space for HELCOM, but also OSPAR, Black Sea Secretariat and the Mediterranean, to jump in” (Interview with Authority 1). Regarding the EU Baltic Sea Region Strategy and younger member states of the EU, one stakeholder said that: “it is a very good thing because at least the awareness will then rise among these countries” (Interview

with Stakeholder 1). Although, the EU Strategy for the Baltic Sea Region is criticized by some of the interviewees: “...whereas I would say that the Baltic Sea Strategy, that’s a disappointment, they ended up copying the HELCOM things and, you know, they somehow don’t give any new sparks or any new sort of instruments or very little new carrots or anything” (NGO 3). “...it’s the strategy of the three No’s as we say: No new money, No new legislation, No new institution. So the question is really what is this? If it can change EU’s policies and sharpen up EU’s policies for the Baltic Sea Region, that would be very, very good” (Authority 5).

What also contributes to the big influence of HELCOM in eutrophication-related issues is the fact that the BSAP contains figures in how much each country should reduce their nutrient loads. This means that the responsibility to act has been divided between the countries. “It is the eutrophication section that actually has this numbers. I think a number of high key people on ministerial level who were really set on that this time it is going to happen” (Interview with Scientist 1). From stakeholders in Sweden there is a wish to introduce a trading system where a part of Sweden’s quotas of reduction in nutrient loads could be used in other countries for more cost-effective measures and because of Swedish agriculture already has a lot of measures taken to reduce nutrient loads (LRF 2010b). In Finland stakeholders discuss a “sufferer’s pay principle” instead of “the polluter pays principle” as Finland and Sweden are the counties that are most affected by eutrophication but also have resources to pay for measures done elsewhere (interview with Stakeholder 1).

The sectoral approach is a problem both within the EU and within HELCOM. HELCOM is an arena for the ministries of environment and that is mention by several interviewees as a problem. “And definitely HELCOM has a problem because it’s people from the Ministries of the Environments sitting there on the meetings and there are seldom people from other ministries taking part, so that’s a problem” (Authority 5). “...well, there are three sectors that are more or less engaged, the agricultural sector and of course fishery sector and now and then shipping, maritime activities. ...But in general, as I said, it’s a very environmental thing, still. I mean there has only been one high level meeting with ministers from the state secretaries and the agriculture and environment sectors” (Interview with NGO 2). The agricultural sector is also highly depending on what decisions are made within EU. “So try to decide, in HELCOM, how this should be done, that’s very difficult, because the discussions are in Brussels and not in HELCOM” (Authority 6). Recently though there seems to be a small progress in the agricultural sector with the new Baltic Agriculture and

Environment Forum inside HELCOM, with the aim is to address issues of pollution originating from farmland related to the protection of the Baltic Sea (HELCOM 2010i).

There is a contradiction though, since HELCOM is an arena for environmental ministries from countries around the Baltic Sea and the fact that HELCOM has recommendations and no legal power, the work within HELCOM can be more progressive and with tougher objectives than within EU. This can be an advantage compared with having the work done in EU, which probably would slow down the process. “But if we have EU policy for example, that’s European measures and many countries are not interested in having stricter measures just because a little Baltic area needs that. And many countries, they don’t have so much problems with eutrophication” (Interview with Authority 5). EU is also seen as an obstacle in the communication with Russia. “For instance if you talk to people in Russia, say major political or political Russians, they just refuse to discuss if you say “Directives”, it’s out of the question so leave it, it’s not possible” (NGO 2).

5.3.2 Communication with and between stakeholders

The structure within HELCOM makes it possible for stakeholders and NGOs to communicate and contribute with knowledge. The meetings of the Heads of Delegation are intended to promote cooperation with NGOs and are therefore open for one representative from the organisations that the Commission has given observation status (HELCOM, 2010b). Cooperation - not just among the contracting parties within HELCOM but also with other stakeholders – is considered to be a crucial factor for success. This view is presented in the HELCOM Ministerial Declaration where it is stated that coordination and cooperation among different actors and regulations in the field is, and will be even more important in the future (HELCOM 2003). Among the interviewees, HELCOM is also described as a platform where discussions among different stakeholders can be held. “I think it’s important that stakeholders are involved, both stakeholders which are causing the problem, and environmental organisations. And for example in HELCOM they are involved...” (Authority 5). NGOs are recognised as very active in HELCOM and they are by several seen as important when “... many times they are the only ones saying the truth” (Authority 5). In the interview with NGO 1 this role is confirmed: “So we have to be the bad boy that put up the all the dirty questions on the top”. Other NGOs prefer to have another approach: “Yes, we are happy to be very self-independent and we can say what we want but we don’t actually very often want to say, we more like to negotiate with different stakeholders and find the good solutions rather than say something very loud” (NGO 4). Cooperation between stakeholders and NGOs are not without problems since there can be hesitations from members on both sides within the organisations and also that very radical

NGOs can act hindering in the governance process since their solutions for solving the problem is radical and unrealistic which affect the view on all NGO's. (Interviews with Scientist 1, NGO 2 and Stakeholder 1).

Difficulties in communication inside EU are a problem that is raised in several of the interviews, especially when different bodies are including decisions relating to eutrophication. The reformation of the Common Agricultural Policy (CAP) is the most important policy to discuss for the moment within EU which also is stated in WP1. DG REGIO and its work with the EU Strategy for the Baltic Sea Region is also criticised to have a lot of project going on but no coordination. According to Authority 1, a more active part of DG REGIO in the communication between stakeholders could improve the present situation (Interview with Authority 1).

5.3.3 Communication with scientists

In several of the interviews, better communication from scientists to both politicians and stakeholders is expressed, but also in the reversed direction as Scientist 1 said: "The society, the management, must be good enough to put relevant questions to scientists and scientists have to be good enough to answer them in a relevant way, understandable to someone that is not a specialist". One stakeholder said that "there is not enough, these ways of communicating between decision makers, policy makers and research. And so the vector between these two is missing. And very often, coming from the research world myself, very often it's a question about sort of communicating science", and also that there is a need for more knowledge on local basis: "There are no "one size fits all"-solutions" (Interview with Stakeholder 1). The different NGOs also show frustration of the lack of communication between the science community and the society in general. "...the information from the scientists, how it goes to farmers and advisers and consumers, it doesn't happen almost at all" (NGO 4). Another NGO expresses that there are an overload of seminars and meetings but the advice from the science community to politicians is missing. However, in such situations the NGOs can act as bridges and fill in that gap. Communication problems are not only due to the scientists, the political sphere has also a responsibility. As NGO 3 says in the interview: "But then I think the problem is with the, sort of, political level. That somehow the political level is so far from the scientific community and also the pragmatic level that they don't see..." (NGO 3). In response to this, scientific arguments are not the only ones that matter in management options: "Honestly, politicians are not the ones who judge of the value of science. Here political decisions are taken and they may or may not consider what science says" (Authority 5).

5.3.4 Communication with general public and the participatory approach

Much of the communication from authorities to a wider public is considered to be a one-way communication where different kinds of statements, press releases and also reports are used. Also in this respect HELCOM is acknowledged for their work with informative and readers' friendly reports (Interview with Authority 5). Within EU there are processes for consultation that includes not only stakeholders but also ordinary citizens. The problem is as Authority 2 says; "Very few people know that because they can't even find their way through their website". Instead much of the communication to a wider public is done by NGOs. Also media play an important role when reporting about *e.g.* algal blooms and for raising the awareness among the public, which also could affect other sectors to act (Authority 5). The public support is also important, as Authority 1 mentions: "Because they pay all the tariffs and fees for the water use, for example, so off course they need to be aware of the issue as well and understand why it's important". Beside the role of the media in reporting about eutrophication as a good thing for raising the public awareness, a number of NGOs and Authority 5 would like more reports about good examples and measurements in media. They feel that it would give people hope and a wider understanding. Since there is no central institution dealing with communication to a wider public, there is a huge difference in public awareness and media reports between the countries (Interview with Authority 5). This also reflects the knowledge about eutrophication and must be dealt with when you communicate with the public of different countries (NGO 2).

Consultation, engagement and participation among stakeholders are seen as crucial if political actions will be effective (Österblom *et.al* 2010). Within the agricultural sector there is a frustration over the time limits for reaching a good ecological status set in BSAP and WFD, because the measures taken in agriculture will take time before results will show and there is a fear that whatever they do it will not be enough (LRF 2010b, Interview with Stakeholder 1). People at the grass root level and local authorities, with good knowledge of details in the agriculture sector are not heard at the ministerial level which is seen as an obstacle in participation with stakeholders (Interview with NGO 4). The outcome of measures in agriculture is not recalled as enough evaluated and there is a wish of doing measures more stepwise then what regulations as the Nitrates Directive and BSAP calls for today (Interview with Authority 6). Stepwise measures with good support is needed for keeping stakeholders motivated according to stakeholders and just criticism without discussions and collaboration will lead to a withdrawal of interest from the stakeholders (Interview with Stakeholder 1). The need for more communication with stakeholders is stressed by

both Stakeholder 1 and Authority 6 (Interviews with Stakeholder 1 and Authority 6), and on a direct question on how to improve stakeholder communication, Stakeholder 1 answered: “Well, give more carrot than stick. But of course it’s the contacts from administration to these stakeholders that they are sort of lively, that they are true contacts and that when different stakeholders discuss issues that they are truly listened to” (Interview with Stakeholder 1).

5.3.5 Communication through projects

Two-ways communication between and among different stakeholders, scientists and authorities are usually established in different projects. Two projects that several interviewees mention as good examples are the Baltic Compass and the Baltic DEAL project. The Baltic Compass (Comprehensive Policy Actions and Sustainable Solutions for Agriculture in the Baltic Sea Region) is aimed at governments, authorities and other actors with the opportunity to influence the way land is used in the region around the Baltic Sea and promote for more efficient policies within agriculture and environment, for more comprehensive investments regarding environmental technologies and the use of best practices. Lead partner is SLU (Swedish University of Agricultural Sciences) and the project is financed by EU and the Baltic Sea Regional Programme 2007-2013. The project has 23 partners from all riparian states (Baltic Compass 2010). Baltic DEAL project (Putting Best Practices in Agriculture into Work) is intended to be running 2010 to 2013 and is a flagship project within the EU Strategy for the Baltic Sea Region. The project is a cooperation between different farmers’ federations around the Baltic Sea, aiming to reduce nutrient loads from agriculture by building advisory services and thereby increase knowledge about water management among farmers (Hoffman 2010). One authority mentioned Baltic DEAL as a good example because it is a project on a grass root level: “And I think they have possibilities to succeed, because they are talking with farmers, farmers are talking with farmers then. That’s better, it’s making a lot, because they are taking things on the same level, that’s very positive, differently than if you come as authority” (Interview with Authority 6). These two projects are collaborating in arranging a stakeholder conference (Baltic Compass 2010), which is seen as a positive sign by *e.g.* the NGOs: “They also cooperate now together and that’s a very good thing because the others go more for the policy and the others go more for the best practices in practical level and if they put their power together they can get a lot and they are doing that” (Interview with NGO 4).

5.3.6 The role of the national level

The governance structures and openness differ between countries, even though all countries within HELCOM are seen as democratic ones. As NGO 2 says in the interview: “I think that’s one quite good thing with this region that it’s quite open. I mean it differs of course a lot between countries. If you are an environmental NGOs in Poland for instance you don’t have access to your minister, the environmental minister and so on, that just doesn’t work, or in Russia of course and so on“(NGO 2). Also the EU Strategy for the Baltic Sea Region and the development of the national implementation plans struggles with internally divergent views from the national ministries (EC 2009b) was a confirmed problem within several of the interviews. E.g. “I think in many countries also, maybe the Ministry of Finance for example is hindering this work because they don’t give money to the environment” (Authority 5). The closeness in the agricultural sector is also problematic according to many of the interviews, especially from the NGOs perspective. “It seems to be very difficult, this sort of cross-sectoral cooperation” (NGO 3). “...in many countries you have big problems with communication between the Ministry of Agriculture and the Environment” (NGO 1).

Besides the role of both EU and HELCOM in the common governance of the Baltic Sea, the national level has its own position, which is clearly raised in the interview with Authority 5:

“Well many of actions which has to be taken, will have to be taken at local level. It’s municipalities, it’s individual farmers and ... While many of the agreements are at much higher level, they may be between states or in EU so that is of course a problem. Because people who taking the actions need to feel that we are part of a bigger problem and to a bigger process and they need to understand that why this is being carried on also. If not, the local level is going to see that the burden is being put on them and that should be avoided as much as possible. So it’s important to have this kind of communication but, I don’t have anything in mind now where I can say it’s works good or bad. But it is at least important to link what national agreements and regional agreements to actions of local level, it is an important thing.”

6. Discussion

Eutrophication is seen as the most severe threat to the Baltic Sea ecosystem. This fact is by now known for marine biologists both from an international and a regional perspective since several decades. As the degradation of the environment has become more and more visible also for the general public, the information has spread to all levels in society. The scientific view on the

situation in the Baltic Sea is shared by most politicians, stakeholders, and the general public in the region. A representative from a non-governmental organisation in one of the interviews in this study concludes the situation in the sentence: “Eutrophication in the Baltic Sea is not a risk, but a fact” (NGO 2). The engagement for a cleaner environment in general and a Baltic Sea not suffered from eutrophication in particular are clearly seen in the number of networks, organisations and institution that have evolved in the Baltic Sea Region. On one hand, many of the persons involved in the governance structures of different levels think that the number of organisations is too many, which is leading to overlapping and an absence of a clear goal. On the other hand, other organisations see the diversity of networks as strength for the collaboration, when there is more than one single approach on the agenda.

An overview of the key organisations, the most important steering documents, and the interactions between the different organisations gives a picture of how the governance structures are build. The Helsinki Commission (HELCOM) has an important role as being the pioneer actor in bringing the countries surrounding the Baltic Sea together. The big advantage with HELCOM is that all the countries in the Baltic Sea Region are involved. The disadvantage is that the decisions made in HELCOM only are recommendations. It is on each country’s national governmental level the promises may turn into force. HELCOM has during the latest decade restructured its organisation when all the Contracting Parties except Russia are members of the European Union. Therefore, the contacts with EU and its legally binding directives have reorganised the structures of HELCOM. A tight cooperation between HELCOM and EU is most beneficial for the Baltic Sea Region, which also is the primary level of governance, *i.e.* mainly top-down regulated.

The HELCOM Baltic Sea Action Plan (BSAP), which is following the concept of the ecosystem approach, is a strategy to concretise the targets that will directly lead to success in reaching the main goal of “good ecological status” in the Baltic Sea. The linkage of the ecological status to economic costs by modelling of scenarios in a decision-support system (the Nest model; <http://nest.su.se/nest>) is a comprehensive way to a holistic approach of the problem. Besides the HELCOM BSAP, the EU directives for nitrate, urban waste water treatment, water framework, and marine strategy are the key documents in the work for a Baltic Sea with less impact of eutrophication. Of these documents, especially the Water Framework Directive (WFD) can be regarded as “*the*” directive for the eutrophication related issues in the Baltic Sea. The WFD includes all inland and coastal waters inside the EU.

Based on the interviews made for this study, the most problematic issues on the governmental level, which also have repercussions on the communication level, are the agricultural policy and the communication with Russia. As agriculture is the diffuse source which influences the eutrophication situation in the Baltic Sea most severe, the regulations of the agriculture policy must meet the principles of a sustainable development and the rest of the conventions for a future state of the Baltic Sea with lesser nutrient loading than the present situation. The EU's Common Agricultural Policy (CAP) is the authority that gets most criticism among the persons interviewed in this study. On one hand the CAP is two-sided to its structure with plans for a sustainable rural development, but is at the same time giving subsidies for conventional agriculture. On the other hand is CAP not in synergy with WFD and MSFD. In many of the interviews, demands and hopes for a reform of CAP are expressed. *E.g.*, "Hopefully CAP and MSFD will be more closed in connection when CAP is reviled in 2013" (Interview with Authority 2), "CAP is not working properly, it is concentrating on conventional, intensive farming. CAP needs a regionalisation and stronger requirements for *e.g.* fertilisers" (Interview with NGO 1). "CAP needs to reform and broadening the debate", "The environmental sector in the Baltic Sea Region meet, but not the agricultural sector", "The agricultural sector is really close. The agricultural ministers of all countries are more defending their positions than interacting" (Interview with NGO 2). However, a new forum within HELCOM, Baltic Agriculture and Environment Forum, is established and held its first meeting in Helsinki in November 2010. The aim is to address issues of pollution originating from farmland related to the protection of the Baltic Sea (HELCOM 2010i). The issue is complicated by the fact that there is a wide difference among the farmers, which is pointed out by one NGO: "There are so many different farmers. I know the whole varieties of different people are there, among farmers, they just do the same work. And some does it as their main job and some does it as a hobby and some does because they have to, because they have no choice, because it's their fathers land and they have to take care of it. So there are women and men, young and old, all kinds of people" (Interview with NGO 4). Since they are the ones that will implement the measures is it necessary to keep them involved in the process, a dialog with stakeholders and authorities at all levels is crucial for achieving results. CAP is dealing with agriculture in whole Europe and it may be hard to get all reformations done. Authorities have mentioned this as problem *e.g.*: "But if we have EU policy for example, that's European measures and many countries are not interested in having stricter measures just because a little Baltic area needs that" (Interview with Authority 5), and "Maybe you can regulate everything if you want to. But sometimes it will be so complex, because you have to look into every plot really, and that's not possible" (Interview with Authority 6). A two-way communication within the national level is of great importance for getting results.

The EU Strategy for the Baltic Sea Region is sorted under the Directorate General for Regional Policy (DG Regio). One of the programme's priorities is to manage the Baltic Sea as a common resource and supports operation that will limit environmental pollution where all EU members bordering the Baltic Sea are involved, but also the Russian Federation, Belarus and Norway. The aim is to combine EU Strategy for the Baltic Sea Region and Regional Policy with WFD (Anon 2009b). The structure seems carefully planned, but critic is also rose, *e.g.* "DG Regio has too little knowledge and experience of the Baltic Sea Region" (Interview with NGO 3). If there is critic in the top-down regulation inside EU for generalising the issues too much and neglecting regional differences inside the union, the communication with the Russian Federation also seems to be problematic. According to *e.g.* the interviews with Authority 2 and NGO 2, the Russian stakeholders involved in HELCOM want to focus on the the cooperation and work inside HELCOM and not broaden the connections to MSFD or any other of the EU regulations. Besides Russia, the new EU members, Poland, Estonia, Latvia and Lithuania, have more interest in concentrating on the EU directives compared to the recommendations given by HELCOM. "They do not care in HELCOM, but HELCOM with binding directives would disappear" (Interview with NGO 2).

In discussing the cooperation and communication of eutrophication-related issues in the Baltic Sea Region, the perspectives are divided into two parts. On the one hand, the framing of a common problem – the environmental state of the Baltic Sea – is acting for an openness and positive cooperation climate among the countries involved. On the other hand, still the amount of insufficient in communications influence the impact of concrete actions to reach the objective goal "A Baltic Sea not suffering from eutrophication". *I.e.* improvements in the linkages on an intra-EU level as well as between science and management are needed.

The analysis of interactions between the scientific assessments and management activities revealed the paramount importance of science in the regulation regime for eutrophication in the Baltic Sea. The major governance frameworks like HELCOM's BSAP and the EU directives rely almost exclusively on scientific knowledge as a basis for their management objectives. Based on this scientific framing of the whole issue a consensus is established regarding both the actual risks connected with eutrophication, the problems related to the phenomenon (summer algal blooms, hypoxia), as well as the major sources (nutrient inputs) and appropriate management structures to combat eutrophication in the Baltic Sea (reducing nutrient inflows). There is however also an

awareness that this system is too fragile and highly unsophisticated because it is basically missing any form of broader stakeholder involvement or even a thorough assessments of the socio-economic consequences (e.g. scientists 1, 3; authority 6).

7. Preliminary recommendations

Preliminary recommendations that can be drawn from our case study for Workpackages 1-3 in connection with risk governance, risk assessment and management, as well as risk framing and communication in relation to the eutrophication in the Baltic Sea:

- The governance structure within EU's Common Agricultural Policy would reform and meet the goals for the Water Framework Directive and the Marine Strategy Framework Directive.
- A sustainable development of the Baltic Sea Region should benefit for better cooperation between EU and the Russian Federation.
- The biggest communication obstacles are the sector-wise government inside EU, the cooperation between science and management, and between local authorities on the national level and the international governance structures. The willingness to interaction exists, but there seems to be a barrier in the information flow between the sectors.
- The very close and exclusive relationship between science and management might prove to be an obstacle for future governance developments since it does not fully take into account socio-economic perspectives and any other stakeholder views apart from science and policy-making

REFERENCES

- Ærtebjerg G, Andersen J.H., Hansen O.S. (eds.) (2003) Nutrients and eutrophication in Danish marine waters. A challenge for science and management. National Environmental Research Institute, Roskilde.
- Ambio, 1990, 19 (3), special issue: Marine Eutrophication.
- Ambio, 2007, 36 (2-3), special issue: Science and Governance of the Baltic Sea.
- Andersen, J.H. et al., 2010. Getting the measure of eutrophication in the Baltic Sea: towards improved assessment principles and methods. *Biogeochemistry*, published online 21. July 2010; DOI 10.1007/s10533-010-9508-4.
- Anon, 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal of the European Communities L327/1.
- Anon., 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). Official Journal of the European Communities L 164/19.
- Anon. 2009a. Eutrophication in the Baltic Sea. Baltic Sea Environment Proceedings No. 115B. <http://www.helcom.fi/publications/bsep/en_GB/bseplist/> Acc 2010-07-01
- Anon, 2009b. First 24 transnational cooperation projects .. and their contribution to the EU Strategy for the Baltic Sea Region. Joint Technical Secretariat of the Baltic Sea Region Programme 2007-2013. <http://ec.europa.eu/regional_policy/cooperation/baltic/pdf/first24_project.pdf> Acc 2010-12-03
- Aps, R. G. Martin & O. Roots, 2010. Baltic Sea Action Plan process – co-production of science and policy. In Brebbia, C.A., Jovanovic, N. & Tiezzi E. (eds.) Management of Natural Resources, Sustainable Development and Ecological Hazards, II. WIT Press Ashurst, Southampton.
- Backer, H., 2008. Indicators and scientific knowledge in regional Baltic Sea environmental policy. *ICES Journal of Marine Science*, 65: 1398–1401.
- Backer, H., & J-M. Leppänen, 2008. The HELCOM system of a vision, strategic goals and ecological objectives :implementing an ecosystem approach to the management of human activities in the Baltic Sea. *Aquatic Conservation: Freshwater and Marine Ecosystems* 18, 321-334.
- Backer, H., Leppänen, J-M., Brusendorff, A. C., Forsius, K., Stankiewicz, M., Mehtonen, J., Pyhälä, M., Laamanen, M., Paulomäki, H., Vlasov, N., Haaranen, T., 2009. HELCOM Baltic Sea Action Plan – A regional programme of measures for the marine environment based on the Ecosystem Approach. *Marine Pollution Bulletin* 60, 642-649.
- Baltic 2020, (2009a). About Baltic Sea 2020, history. <http://www.balticsea2020.org/index.php?option=com_content&view=article&id=133&Itemid=93&lang=en> Acc 2010-06-29.
- Baltic 2020, (2009b). Baltic Sea 2020, annual report (in Swedish). <http://www.balticsea2020.org/index.php?option=com_content&view=article&id=164&Itemid=111&lang=en> Acc 2010-06-29
- Baltic Compass, 2010. About Baltic Compass, Baltic Compass in brief. <<http://www.balticcompass.org>> Acc 2010-12-13
- Blenckner, T. et. al., 2009. Synchronous regime shifts in Baltic Sea ecosystems: Similarities and dissimilarities in response to climate, nutrients and fisheries. Conference Proceedings. International Conference on Climate Change: The environmental and socio-economic response in the southern Baltic region University of Szczecin, Poland 25-28 May 2009.

- Boesch, D.F. 2002. Challenges and opportunities for science in reducing nutrient over-enrichment of coastal ecosystems. *Estuaries* 25: 886-900.
- Bonsdorff, E. & T. H. Pearson, 1999. Variation in the sublittoral macrozoobenthos of the Baltic Sea along environmental gradients; a functional-group approach. *Aust. J. Ecol.* 24: 312-326.
- Bonsdorff, E., C. Rönnerberg & K. Aarnio, 2002. Some ecological properties in relation to eutrophication in the Baltic Sea. – *Hydrobiol.* 475/476: 371-377.
- Browman, H.I. & K.I. Stergiou, 2004. Perspectives on ecosystem-based approaches to the management of marine resources. *THEME SECTION: Mar. Ecol. Prog. Ser.* 274: 269-303.
- BSAG, 2010a. About Baltic Sea Action Group. <<http://en.bsag.fi/bsag>> Acc 2010-07-02
- BSAG, 2010b. Baltic Sea Action Group, Commitment book. <<http://www.bsas.fi/commitments>> Acc 2010-07-05
- BSAG, 2010c. Baltic Sea Action Group, Actions. <<http://en.bsag.fi/actions/agriculture-and-bioenergy>> Acc 2010-07-01
- BSSSC, 2009. Baltic Sea States Subregional Co-operation, Key Priority Areas 2009-2010. <<http://www.bsssc.com/section.asp?id=1350&pid=1350>> Acc 2010-08-07
- BSSSC, 2010. BSSSC Working Group on Maritime Policy. <<http://www.bsssc.com/section.asp?id=1559&pid=91>> Acc 2010-08-07
- Caddy, J.F., 1993. Towards a comparative evaluation of human impacts on fishery ecosystems of enclosed and semi-enclosed seas. *Rev. Fish. Sci.* 1, 57-95.
- Carpenter, S. R. & C. Folke, 2006. Ecology for transformation. *TRENDS in Ecology and Evolution* Vol.21 No.6, 309-15.
- Carstensen J, D.J. Conley, J.H. Andersen & G. Ærtebjerg, 2006. Coastal eutrophication and trend reversal: a Danish case study. *Limnol. Oceanogr.* 51(1,2):398–408.
- Casini, M., J. Lövgren J, Hjelm, M. Cardinale, J.C. Molinero & G. Kornilovs, 2008. Multi- level trophic cascades in a heavily exploited open marine ecosystem. *Proceedings of the Royal Society of London, SeriesB: Biological Sciences* 275: 1793-801.
- Casini M, J. Hjelm, J.C. Molinero, J. Lövgren, M. Cardinale, V. Bartolino et al., 2009. Trophic cascades promote threshold-like shifts in pelagic marine ecosystems. *Proceedings of the National Academy of Sciences of the United States of America* 106: 197-202.
- CBSS, 1992. Ministerial Session – Copenhagen Declaration, Conference of Foreign Ministers of the Baltic Sea States, Copenhagen, March 5-6, 1992.
- CBSS, 2007. Joint Statement by the High-Level Representatives from Ministries of Agriculture and Environment of CBSS Member States, Saltsjöbaden, Sweden 19-20 April 2007.
- CCB, 2010. About CCB. <<http://www.ccb.se/about.html>> Acc 2010-06-07
- Christensen, N.L., 1996. The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management. *Ecological Applications*, Vol. 6 (3), 665-91.
- Cloern, J. E. 2001. Our evolving conceptual model of the coastal eutrophication problem. *Mar. Ecol. Prog. Ser.* 210: 223-253.
- COM, 2009. Communication from the Commission concerning European Union Strategy for the Baltic Sea Region. <http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/baltic/com_baltic_en.pdf> Acc 2010-07-29
- Conley D.J., 2010. Talk at the HELCOM seminar Building marine policy on best available knowledge. 25 August 2010 Stockholm, Sweden.
- Conley, D.J., J. Carstensen, G. Ærtebjerg, P.B. Christensen, T. Dalsgaard, J.L.S. Hansen & A.B. Josefson, 2007. Long-term changes and impacts of hypoxia in Danish coastal waters. *Ecol. Appl.* 17: 165-184.

Conley, D.J. et al., 2009a). Hypoxia-Related Processes in the Baltic Sea. *Environ. Sci. Technol.*, 43(10) 3412-20.

Conley DJ, H.W., Paerl, R.W. Howarth, D.F. Boesch, S.P. Seitzinger, K.E. Havens, C. Lancelot & G.E. Likens, 2009b). Controlling eutrophication: nitrogen and phosphorus. *Science* 323: 1014-15.

Consilium, 2010. Counsilium of the European Union. <<http://www.consilium.europa.eu/showPage.aspx?id=&lang=en>> Acc 2010-07-01

COWI, 2007. Economic analysis of the BSAP with focus on eutrophication. Final report. April 2007, 112 pp.

de Jonge, V.N., M. Elliott & E. Orive, 2002. Causes, historical development, effects and future challenges of a common environmental problem: eutrophication. *Hydrobiol.* 475/476: 1-19.

Diaz, R.J. & R. Rosenberg, 2008. Spreading dead zones and consequences for marine ecosystems. *Science* 321: 926-929.

DN, 2010. Dagens Nyheter: Många försenade Östersjöplaner, 2010-05-20. <<http://www.dn.se/nyheter/varlden/inga-bindande-overgodningskrav-1.1108773>> Acc 2010-12-09

Duarte, C.M., D.J. Conley, J. Carstensen & M. Sánchez-Camacho, 2009. Return to Neverland: Shifting Baselines Affect Eutrophication Restoration Targets. *Estuaries and Coasts* 32:29-36.

Ducrottoy, J-P, M. Elliott, 2008. The science and management of the North Sea and the Baltic Sea: Natural history, present threats and future challenges. *Mar. Pollut. Bull.* 57: 8-21.

EC 2010e. European Commission, Agriculture and Rural Development. <http://ec.europa.eu/agriculture/envir/index_en.htm> Acc 2010-07-01

EC Environment, 2010a). European Commission Environment, implementation of the nitrates directive.<http://ec.europa.eu/environment/water/water-nitrates/index_en.html> Acc 2010-07-01

EC Environment, 2010b). European Commission Environment, Urban Waste Water Directive Overview.<http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html> Acc 2010-07-01

EC Environment, 2010c). European Commission Environment, Introduction to the new EU Water Framework Directive. <http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm> Acc 2010-07-01

EC, 2009a). Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions concerning the European Union Strategy for the Baltic Sea Region. COM 248.

EC, 2009b). Commission Staff Working Document concerning the European Union Strategy for the Baltic Sea Region, Action Plan, SEC (2009) 712/2, 74 p, <http://ec.europa.eu/regional_policy/cooperation/baltic/index_en.htm> Acc 2010-12-10.

EC, 2010a). European Commission Environment, The Sixth Environment Action Programme of the European Community 2002-2012. <<http://ec.europa.eu/environment/newprg/index.htm>> Acc 2010-07-01

EC, 2010b). European Commission. <http://ec.europa.eu/index_en.htm> Acc 2010-07-01

EC, 2010c). European Commission, Joint Research Centre. <<http://ec.europa.eu/dgs/jrc/index.cfm?id=10>> Acc 2010-07-01

EC, 2010d). European Commission, Joint Research Centre, Institute for Environment and Sustainability.<<http://ies.jrc.ec.europa.eu/marine-eutrophication>> Acc 2010-07-01

EEA, 2010. European Environment Agency. <<http://www.eea.europa.eu/>> Acc 2010-07-01

EEB, 2010. European Environmental Bureau. <<http://www.eeb.org/>> Acc 2010-07-01

Elliott, M. 2002. The role of the DPSIR approach and conceptual models in marine environmental management: an example for offshore wind power. *Mar. Poll. Bull.* 44: iii-vii.

Elmgren, R. 2001. Understanding human impact on the Baltic ecosystem: Changing views in recent decades. *Ambio* 30: 222-231.

- Elmgren, R. & U. Larsson, 2001. Eutrophication in the Baltic Sea area: integrated coastal management issues. In: von Bodungen, B. & R. K. Turner (eds.), Science and integrated coastal management, Dahlem University Press, Berlin, pp. 15-35.
- Elofsson, K., 2010. The costs of meeting the environmental objectives for the Baltic Sea: A review of the literature. *Ambio* 39: 49-58.
- ENVI-News, 2010a. Newsletter from the European Parliament Environment, Public Health and Food Safety Committee, Number 5/2010. <<http://www.europarl.europa.eu/activities/committees/homeCom.do?language=EN&body=ENVI>> Acc 2010-07-01
- ENVI-News, 2010b. Newsletter from the European Parliament Environment, Public Health and Food Safety Committee, Number 6/2010. <<http://www.europarl.europa.eu/activities/committees/homeCom.do?language=EN&body=AGRI>> Acc 2010-07-01
- EP, 2010. European Parliament. <http://www.europarl.europa.eu/news/public/default_en.htm> Acc 2010-07-01
- EU Baltic net, 2010. Baltic Sea Region Programme 2007-2013. <http://eu.baltic.net/Project_Database.5308.html?&&contentid=54&contentaction=single> Acc 2010-07-28
- Eur-Lex, 1991a). Access to European Union Law, Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources. <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0676:EN:NOT>> Acc 2010-07-01
- Eur-Lex, 1991b). Access to European Union Law, Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment. <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0271:EN:NOT>> Acc 2010-07-01
- Eur-Lex, 2000. Access to European Union Law, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>> Acc 2010-07-01
- Eur-Lex, 2008. Access to European Union Law, Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0056:EN:NOT>> Acc 2010-07-01
- Europa, 2010. Europa, Gateway to the European Union. <http://europa.eu/index_en.htm> Acc 2010-07-01
- Funtowicz S. & J.R. Ravetz, 1993. Science for the post-normal age. *Futures* 25: 739–755.
- Garcia, S.M. & K.L. Cochrane, 2005. Ecosystem approach to fisheries: a review of implementation guidelines. *ICES Journal of Marine Science*, 62: 311-18.
- Gren, I-M., 2008a). Costs and benefits from nutrient reductions to the Baltic Sea. Draft report, Swedish Environmental Protection Agency.
- Gren I.M., 2008b). Cost effectiveness and fairness of the HELCOM Baltic Sea Action Plan against Eutrophication. *VATTEN* 64:273–281.
- Gren, I.-M., K. Elofsson & P. Jannke, 1997. Cost-effective nutrient reductions to the Baltic Sea. *Environmental & Resource Economics* 10: 341–362.
- HELCOM, 1996. Third periodic assessment of the state of the marine environment in the Baltic Sea 1989-1993; background document. *Baltic Sea Environ. Proc.* No. 64B, 252 pp.
- HELCOM, 2002. Fourth Periodic Assessment of the State of the Marine Environment of the Baltic Sea, 1994–1998. *Baltic Sea Environment Proceedings* No. 82B. Helsinki Commission, 215 pp.

HELCOM, 2003. HELCOM Ministerial Declaration (adopted by the HELCOM Ministerial Meeting on June 2003). <<http://www.helcom.fi/stc/files/MinisterialDeclarations/Bremen2003.pdf>> Acc 2010-12-10

HELCOM, 2006. Development of tools for assessment of eutrophication in the Baltic Sea. Baltic Sea Environmental Proceedings No. 104. Helsinki Commission, 64 pp.

HELCOM 2007. HELCOM Baltic Sea Action plan (adopted by the HELCOM Ministerial meeting in Poland 2007).

HELCOM, 2008. Manual for Marine Monitoring in the COMBINE Programme of HELCOM. <http://www.helcom.fi/groups/monas/CombineManual/en_GB/main/>. Acc 2010-12-06

HELCOM, 2009a). Eutrophication in the Baltic Sea – An integrated thematic assessment of the effects of nutrient enrichment in the Baltic Sea region. Balt. Sea Environ. Proc. No. 115B. 148 pp.

HELCOM, 2009b). Eutrophication in the Baltic Sea. Background Report. Available online: <http://www.helcom.fi> . Balt. Sea Environ. Proc. No. 115C.

HELCOM, 2009c). Eutrophication in the Baltic Sea. An integrated thematic assessment of the effects of nutrient enrichment in the Baltic Sea region. Executive Summary. Balt. Sea Environ. Proc. No. 115A.

HELCOM, 2010a). About HELCOM. <http://www.helcom.fi/helcom/en_GB/aboutus/> Acc 2010-05-01

HELCOM, 2010b). Groups – LAND. <http://www.helcom.fi/groups/LAND/en_GB/main/> Acc 2010-05-02

HELCOM, 2010c). Groups – Land – Working Programme. <http://www.helcom.fi/groups/LAND/en_GB/WP/> Acc 2010-05-07

HELCOM, 2010d). Projects – Ongoing HELCOM projects – Baltic Compass. <http://www.helcom.fi/projects/on_going/en_GB/BalticCOMPASS/> Acc 2010-07-05

HELCOM, 2010e). Projects – Balthazar. <http://www.helcom.fi/projects/en_GB/BALTHAZAR/> Acc 2010-07-05

HELCOM, 2010f). Groups – MONAS. <http://www.helcom.fi/groups/monas/en_GB/monas_main/> Acc 2010-07-05

HELCOM, 2010g). Projects – Ongoing HELCOM projects – 5th Baltic Sea Pollution Load Compilation. <http://www.helcom.fi/projects/on_going/en_GB/plc-5/> Acc 2010-05-07

HELCOM, 2010h). Groups – MARITIME. <http://www.helcom.fi/groups/maritime/en_GB/main/> Acc 2010-07-05

HELCOM, 2010i). Press release, HELCOM launches Baltic Agriculture and Environment Forum. <http://www.helcom.fi/press_office/news_helcom/en_GB/Agri_Env_Forum/> Acc 2010-12-03

HELCOM, 2010j). Ecosystem Health of the Baltic Sea 2003-2007: HELCOM Initial Holistic Assessment. Balt. Sea Environ. Proc. No. 122, 63 pp.

HELCOM, 2010k). Heads of Delegation 33rd Meeting Stockholm, Sweden, 23-24 August 2010; HELCOM HOD 33/2010.

HELCOM, 2010l). Fifth Periodic Load Compilation. Helsinki Commission (in press)

HELCOM & OSPAR, 2003). Declaration of the first Joint Ministerial Meeting of the Helsinki and OSPAR Commissions. Bremen, 25–26 June 2003, www.helcom.fi.

Hoffman, M., 2010. Newsletter of Baltic Farmers Forum on Environment (BFFE), January 2010. <http://www.lrf.se/PageFiles/23947/BFFE_newsletter_0912.pdf> Acc 2010-12-13

Howarth, R.W. & R. Marino R., 2006. Nitrogen as the Limiting Nutrient for Eutrophication in Coastal Marine Ecosystems: Evolving Views over Three Decades. Limnology and Oceanography, Vol. 51: 364-76.

ICES, 2007. Report of the ICES/HELCOM Working Group on Integrated Assessments of the Baltic Sea (WGIAB), 12-16 March 2007, Hamburg, Germany.

ICES, 2008. ICES strategic plan: *A vision worth sharing*. <<http://www.ices.dk/iceswork/AVisionWorthSharing2008.pdf>> Acc 2010-06-07

ICES, 2009. Resolutions SSGHIE/SSGHIE Resolutions 2009. <<http://www.ices.dk/iceswork/recs/2009%20Resolutions/SSGHIE/SSGHIEResolutions2009.pdf>> Acc 2010-06-07

ICES, 2010a). ICES – About us – What is ICES. <<http://www.ices.dk/aboutus/aboutus.asp>> Acc 2010-06-07

ICES, 2010b). ICES –Projects. <<http://www.ices.dk/projects/BSRP.asp>> Acc 2010-05-28

IEEP, 2010. Institute for European Environmental Policy. <<http://www.ieep.eu/>> Acc 2010-07-01

IMO, 2005. New rules to reduce emissions from ships enter into force. <http://www.imo.org/Newsroom/mainframe.asp?topic_id=1018&doc_id=4884> Acc 2010-06-02

IMO, 2007. Prevention of Pollution by Sewage from Ships. <http://www.imo.org/Environment/mainframe.asp?topic_id=237> Acc 2010-06-01

IMO, 2010. International Maritime Organization. <<http://www.imo.org/>> Acc 2010-05-31

Jansson, B-O. 1997. The Baltic Sea: current and future status and impact of agriculture. *Ambio* 26: 424-431.

Jasanoff, S. (ed.), 2004. *States of Knowledge: The Co-Production of Science and Social Order*. London: Routledge.

Joas, M., D. Jahn & K. Kern, 2008. Governance in the Baltic Sea Region: Balancing states, cities and people. In: Joas, M., D. Jahn & K. Kern (eds.), *Governing a Common Sea. Environmental Policies in the Baltic Sea Region*. Earthscan, London, p. 3-15.

Joas, M., K. Kern & S. Sandberg, 2007. Actors and arenas in hybrid networks: implications for environmental policymaking in the Baltic Sea region. *Ambio* 36: 237-242.

John Nurminen Foundation, 2010a. John Nurminen Foundation. <<http://www.johnnurminenfoundation.com/>> Acc 2010-09-10

John Nurminen Foundation, 2010b. Clean Baltic Sea, John Nurminen Foundation, Funding of eutrophication projects. <<http://www.puhdasitameri.fi/en/funding>> Acc 2010-09-10

John Nurminen Foundation, 2010c. Clean Baltic Sea, John Nurminen Foundation, Russia. <<http://www.puhdasitameri.fi/en/russia>> Acc 2010-09-10

John Nurminen Foundation, 2010d. Clean Baltic Sea, John Nurminen Foundation, project background. <<http://www.puhdasitameri.fi/en/eutrophication-69>> Acc 2010-09-10

John Nurminen Foundation, 2010e. Clean Baltic Sea, John Nurminen Foundation, PURE – Project on Urban Reduction of Eutrophication. <<http://www.puhdasitameri.fi/en/eu-project-pure>> Acc 2010-09-10

John Nurminen Foundation, 2010f. Clean Baltic Sea, John Nurminen Foundation, Eutrophication project advisory group. <<http://www.puhdasitameri.fi/en/advisory-group>> Acc 2010-09-10

Jørgensen, B.B. & K. Richardson (eds.), 1996. Eutrophication in coastal marine ecosystems. *Coastal and Estuarine Studies* 52, American Geophysical Union, Washington DC, 272 pp.

Kern, K. & T. Löffelsend, 2004. Governance beyond the nation state in the Baltic Sea region. *Local Environ.* 9: 451-467.

Kern, K. & T. Löffelsend, 2008. Governance beyond the Nation State: Transnationalization and Europeanization of the Baltic Sea Region. In: M. Joas, D. Jahn & K. Kern (eds.), *Governing a Common Sea. Environmental Policies in the Baltic Sea Region*. Earthscan, London, pp. 115-141.

Kern, K., M. Joas & D. Jahn, 2008. Governing a n Sea: comparative patterns for sustainable development. In: M. Joas, D. Jahn & K. Kern (eds.), *Governing a Common Sea. Environmental Policies in the Baltic Sea Region*. Earthscan, London, pp. 215-230.

Kinzig, A. & D. Starrett, 2003. Coping with uncertainty: a call for a new science policy forum. *Ambio* 32: 330-335.

- Klinke, A. & O. Renn, 2002. A new approach to risk evaluation and management: risk-based, precaution-based, and discourse-based strategies. *Risk Analysis* 22: 1071-109.
- Lääne, A., E. Kraav, E. & G. Titova, 2005. Global International Waters Assessment Baltic Sea, GIWA Regional assessment 17. University of Kalmar on behalf of United Nations Environment Programme, 88 pp. Available on-line: <<http://www.unep.org/dewa/giwa/publications/r17.asp>> Acc. 2010-10-01
- Larsson, U., R. Elmgren & F. Wulff, 1985. Eutrophication and the Baltic Sea: causes and consequences. *Ambio* 14: 9-14.
- Leppäkoski, E. & E. Bonsdorff, 1989. Ecosystem variability and gradients. Examples from the Baltic Sea as a background for hazard assessment. In: Landner, L. (ed.), *Chemicals in the aquatic environment*. Springer-Verlag, Berlin, pp. 6-58.
- Lindholm, A. 2002. Finland in EU Environmental Policy. *The Finnish Environment* 551. Ministry of the Environment. <<http://www.ymparisto.fi/download.asp?contentid=14545&lan=en>> Acc 2010-07-01.
- Linke, S. M. Dreyer & P. Sellke. The Regional Advisory Councils: What is their potential to incorporate stakeholder knowledge into fisheries governance? *Ambio* special issue (Coping with Complexity in Baltic Sea Risk Governance, scheduled March 2011). *In press*.
- LRF, 2010a). Lantbrukarnas riksförbund, Baltic Farmers Forum on Environment (BFFE). <<http://www.lrf.se/Miljo/Vatten/Baltic-Farmers-Forum-on-Environment-BFFE/>> Acc 2010-07-28
- LRF, 2010b). Synpunkter från LRF på ”Slutrapport av Naturvårdsverkets regeringsuppdrag 17 i regleringsbrev för 2008: Förslag till nationella åtgärder enligt Baltic Sea Action Plan (BSAP)” (in Swedish), <<http://www.lrf.se/PageFiles/27125/LRF%20Yttrande%20BSAP%2015%20jan%202010.doc>> Acc 2010-12-14
- Lubchenco J., 1998. A new social contract for science. *Science* 279: 491–497.
- Lundberg, C. 2005a). Eutrophication in the Baltic Sea – from area-specific biological effects to interdisciplinary consequences. PhD Thesis, Åbo Akademi University, 166 s. + appendices.
- Lundberg, C. 2005b). Conceptualizing the Baltic Sea ecosystem – an interdisciplinary tool for environmental decision making. *Ambio* 34: 433-439.
- MARE, 2007. Marine Research on Eutrophication - A Scientific Base for Cost-Effective Measures in the Baltic Sea. <<http://www.mare.su.se/index.html>>. Acc 2010-12-09
- McQuatters-Gollop, A., A.J. Gilbert, L.D. Mee, J.E. Vermaat, Y. Artioli, C. Humborg & F. Wulff, 2009. How well do ecosystem indicators communicate the effects of anthropogenic eutrophication? *Est. Coast. Shelf Sci.* 82: 583-596.
- Mee, L. 2005. Assessment and monitoring requirements for the adaptive management of Europe's regional seas. In: Vermaat, J., L. Bouwer, R.K. Turner & W. Salomons (eds.), *Managing European Coasts: Past, Present and Future*. Springer Verlag, Berlin, p. 227-237.
- Mee, L.D., R.L. Jefferson, D. d Á. Laffoley & M. Elliott, 2008. How good is good? Human values and Europe's proposed Marine Strategy Directive. *Mar. Pollut. Bull.* 56: 187-204.
- Minnhagen, S. & O. Lindahl, 2010. Mussel farms as a measure for implementation of the Baltic Sea Action Plan. Nordic Marine Science Conference 14.16. Sept. 2010 Strömstad/ Sweden, <http://nmsc2010.org/wordpress/wp-content/uploads/Oral-Presentations.pdf>.
- MTK, 2010a. MTK's vision, mission and values. <http://www.mtk.fi/MTK_briefly/mtkfacts/en_GB/facts_vision/> Acc 2010-07-28
- MTK, 2010b. MTK is the rural professionals' very own lobby. <http://www.mtk.fi/MTK_briefly/mtkfacts/en_GB/mtkfacts/> Acc 2010-07-28
- MTT, 2010. MTT, history. <https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about/history> Acc 2010-08-08

- NEFCO, 2010a. Nordic Environment Finance Cooperation, Board of Directors 2010. <http://www.nefco.org/introduction/board_members> Acc 2010-07-27
- NEFCO, 2010b. Nordic Environment Finance Cooperation, Mission and Strategy. <http://www.nefco.org/introduction/mission_and_strategy> Acc 2010-07-27
- NEFCO, 2010c. Nordic Environment Finance Cooperation, This is NEFCO. <<http://www.nefco.org/introduction>> Acc 2010-07-27
- NEFCO, 2010d. Nordic Environment Finance Cooperation, BSAP Trust Fund. <http://www.nefco.org/financing/bsap_trust_fund> Acc 2010-07-27
- Neumann, T. & G. Schernewski, 2005. An ecological model evaluation of two nutrient abatement strategies for the Baltic Sea. *Journal of Marine Systems* 56(1–2): 195–206.
- Nixon, S. W. 1995. Coastal marine eutrophication: A definition, social causes, and future concerns. *Ophelia* 41: 199-219.
- Nixon, S.W. 2009. Eutrophication and the macroscope. *Hydrobiol.* 629: 5-19.
- Norden, 2010a). Norden, Official co-operation in the Nordic region. < http://www.norden.org/en/about-nordic-co-operation/nordic-co-operation?set_language=en> Acc 2010-06-14
- Norden, 2010b). Norden, The Nordic Council of Ministers for the Environment (MR-M). <<http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/council-of-ministers-for-the-environment-mr-m/the-nordic-council-of-ministers-for-the-environment-mr-m>> Acc 2010-06-14
- Norden, 2010c). Norden, Nordic Council of Ministers, Om Akvatiska ekosystemgrupper. <<http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/council-of-ministers-for-the-environment-mr-m/institutes-co-operative-bodies-and-working-groups/working-groups/working-group-for-aquatic-ecosystem-aeg/om-akvatiska-ekosystemgrupper>> Acc 2010-06-14
- OSPAR, 2003. OSPAR Integrated Report 2003 on the Eutrophication Status of the OSPAR Maritime Area Based Upon the First Application of the Comprehensive Procedure. Eutrophication Series. OSPAR Commission, 59 pp.
- OSPAR, 2008. Second OSPAR Integrated Report on the Eutrophication Status of the OSPAR Maritime Area. Eutrophication Series. OSPAR Commission, 107 pp.
- OSPAR, 2010. OSPAR Commission. <<http://www.ospar.org/>> Acc 2010-06-17
- Pihlajamäki, M. & N. Tynkkynen. The challenge of bridging science and policy in the Baltic Sea eutrophication governance in Finland: The perspective of science. *Ambio special issue (Coping with Complexity in Baltic Sea Risk Governance, scheduled March 2011)*. *In press*.
- PURE, 2010. PURE project. <<http://www.purebalticsea.eu/index.php/pure:home>> Acc 2010-05-07
- Rockström, J., W. Steffen, K. Noone, Å. Persson, S.S. Chapin III, E.F. Lambin, T.M. Lenton, M. Scheffer, C. Folke, H.J. Schellnhuber, B. Nykvist, C.A. de Wit, T. Hughes, S. van der Leeuw, H. Rohde, S. Sörlin, P.K. Snyder, R. Constanza, U. Svedin, M. Falkenmark, L. Karlberg, R.W. Corell, V.J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen & J.A. Foley, 2009. A Safe operating space for humanity. *Nature* 461: 472-475.
- Rönnberg C. & E. Bonsdorff, 2004. Baltic Sea eutrophication: area-specific ecological consequences. *Hydrobiologia* 514:227–241
- Savchuk, O. & F. Wulff, 2007. Modeling the Baltic Sea eutrophication in a decision support system. *Ambio*, 36: 141–148.
- Savchuk O.P., F. Wulff, S. Hille, C. Humborg & F. Pollehne, 2008. The Baltic Sea a century ago—a reconstruction from model simulations, verified by observations. *J. Mar. Sys.* 74(1-2): 485-94.
- Schernewski, G. & T. Neumann, 2005. The trophic state of the Baltic Sea a century ago: a model simulation study. *J. Mar. Syst.* 53: 109-124.

- Schindler D.W., 1974. Eutrophication and Recovery in Experimental Lakes: Implications for Lake Management. *Science* Vol. 184, No. 4139, pp. 897-899.
- Seamfor, 2010. Science dimensions of an Ecosystem Approach to Management of Biotic Ocean Resources (SEAMFOR). European Science Foundation and ICES Position Paper 14 April 2010.
- SLC, 2010. Svenska lantbruksproducenternas centralförbund in English. <<http://www.slc.fi/english.asp>> Acc 2010-08-03
- Stålnacke, P. 1996. Nutrient loads to the Baltic Sea. Ph. D. thesis, Linköping University, Sweden, Studies in Arts and Science, No 146, Sweden, 78 pp.
- Svendsen LM, L. van der Bijl, S. Boutrup & B. Norup B (eds), 2005. NOVANA: Nationwide Monitoring and Assessment Programme for the Aquatic and Terrestrial Environments. Programme Description—Part 2. National Environmental Research Institute, Denmark. NERI Technical Report No. 537, 137 pp.
- Swedish Ministry for the Environment, 2010. Proposal for Sweden's National Implementation Plan for the Baltic Sea Action Plan. Information material M2010.10.
- Tamminen T. & T. Andersen, 2007. Seasonal phytoplankton nutrient limitation patterns as revealed by bioassays over Baltic Sea gradients of salinity and eutrophication. *Mar Ecol Prog Ser* 340:121–138.
- Trush, S.F. & P. K. Dayton, 2010. What can ecology contribute to ecosystem-based management? *Annu. Rev. Mar. Sci.* 2: 419-441.
- UBC, 2010a). UBC Commission on Environment, Background. <<http://www.ubc-environment.net/index.php/main:history>> Acc 2010-07-27
- UBC, 2010b). UBC Commission on Environment, PURE. <<http://www.ubc-environment.net/index.php/main:pure>> Acc 2010-07-27
- Walters, C. 1997. Challenges in adaptive management of riparian and coastal ecosystems. *Conserv. Ecol.* (online) 1 (2):1, 21 pp. <<http://www.consecol.org/vol1/iss2/art1>> Acc 2010-12-02.
- Waltner-Toews, D., J.J. Kay & N.E. Lister (eds.), 2008. *Ecosystem Approach – Complexity, Uncertainty and Managing for Sustainability*. Columbia University Press, New York.
- Wassmann, P. & K. Olli (eds.), 2005. Drainage basin nutrient inputs and eutrophication: an integrated approach. University of Tromsø, Norway & Tartu University, Estonia, 325 pp. <<http://www.ut.ee/~olli/eutr/>> Acc 2010-07-01
- Wilson, D.C., 2009. *The Paradoxes of Transparency. Science and the Ecosystem Approach to Fisheries Management in Europe*. Amsterdam: Amsterdam University Press.
- Wulff, F., 2008. Is there a future for the Baltic? NEFCO Newsletter December 10. <<http://www.nefco.org/publications/newsletters>> Acc 2010-12-10
- Wulff, F., E. Bonsdorff, I-M. Gren, S. Johansson & A. Stigebrandt, 2001. Giving advice on cost effective measures for a cleaner Baltic Sea: a challenge to science. *Ambio* 30: 254-259.
- WWF, 2009a). WWF Annual review 2009 INT, Gland, Switzerland <http://assets.panda.org/downloads/wwf_int_ar_a4_di10_low_res.pdf> Acc 2010-06-30
- WWF, 2009b). WWF Baltic Sea Farmer of the Year Award 2009, WWF Baltic Ecoregion Programme. <http://www.wwf.se/source.php/1270504/Baltic%20Sea%20Farmer%20Award%202009_rapport.pdf> Acc 2010-06-30
- WWF, 2010a). WWF in brief. <http://wwf.panda.org/wwf_quick_facts.cfm> Acc 2010-06-17
- WWF, 2010b). WWF: history, people, operations. <http://wwf.panda.org/who_we_are/> Acc 2010-06-30
- WWF, 2010c). *Together we can save the Baltic Sea*, WWF Baltic Ecoregion Programme 2010 <<http://www.wwf.se/source.php/1295791/togetherwecansavethebalticsea.pdf>> Acc 2010-06-30

WWF, 2010d). Östersjön – övergödning. <<http://www.wwf.se/v/hav-kust/1007228/1133391-ostersjon-overgodning>> Acc 2010-06-17 (in Swedish)

WWF& CCB, 2010. Environmental NGO (COALITION CLEAN BALTIC AND WORLD WIDE FUND FOR NATURE) statement for HELCOM Ministerial Meeting on the HELCOM Baltic Sea Action Plan. Moscow, Russia 20. MAY 2010.

Österblom, H. & F. Wulff, 2008. Aktionsplan för Östersjön – äntligen kan arbetet börja! Havet 2008 pp. 10-13.

Österblom, H., A. Gårdmark, L. Bergström, B. Müller-Karulis, C. Folke, M. Lindegren, M. Casini, P. Olsson, R. Diekmann, T. Blenckner, C. Humborg & C. Möllmann, 2010. Making the ecosystem approach operational – Can regime shifts in ecological- and governance systems facilitate the transition? Marine Policy 34: 1290-1299.

Interview guide RISKGOV case study ,EUTROPHICATION‘

Name of the interviewee:

Institution:

Contact details:

Date of interview:

Place of interview:

Interviewer:

Length of interview:

Introduction

The RISKGOV project: Environmental Risk Governance of the Baltic Sea; analysis of current governance structures and procedures, weaknesses and recommendations for better problem solving in 5 case studies: overfishing, **eutrophication**, loss of biodiversity, chemical pollution and maritime transportation

Focus of **eutrophication case study**: Governance Structures; Science-Management Interactions & Stakeholder Communication; Nutrient Reduction Plans/ Alternatives

1. Problem Framing

- a) In your own words, how would you **briefly describe** the risk of eutrophication?
- b) What are the **main issues** of the problem? (e.g. relevance of socio-economic, environmental, techno-scientific and of international political aspects)
- c) What are your **main concerns** regarding eutrophication? What would you see as the main sources for the problem and its persistency?
- d) **What is at stake** if the problem is not addressed properly? Who would be (or is already) the most affected?
- e) According to your judgement, **how severe is the problem**?
- f) How would you assess **recent developments** with regard to the problem of eutrophication: has it become more or less severe?
- g) Are you aware of any **means for reducing the risk** and its effects?
- h) Any **potential solutions** you prefer/promote over others?
- i) Whose **responsibility** is it to act on the risk?
- j) Should **cost be borne equally** and collectively or do **certain actors** (e.g. industry, farmers or specific countries) have a larger responsibility?

2. Governance structures

Regional focus of the RISKGOV project: Baltic Sea (BS); we are interested in whether there are appropriate governance structures and procedures in place for dealing with and regulating eutrophication/ nutrient loads in the BS Region.

The main actors in the regulatory framework:

- HELCOMs Baltic Sea Action Plan (BSAP)
- The EUs Nitrates Directive (EU)
- The EUs Water Framework Directive
- EUs Marine Strategy Marine Strategy Directive
- EUs Common Agricultural Policy
-

a) Taking into account the **different organizations** and institutions in the Baltic Sea region with eutrophication on their agenda, do you find the variety of actors a **strength** or **confusing**?

b) Do you think these **institutions work well together**, i.e. produce synergies or do they occasionally contradict each other in any way? If so: in which way?

c) Are you generally **satisfied** with the existing regulatory framework and governance structures? Can you give **examples**? What could/should be **improved**?

d) How are **stakeholders involved** (such as NGOs & industry) right now in the governance process? How should stakeholders be involved for a future environmentally sustainable governance of the Baltic Sea? Do you have ideas for stronger stakeholder involvement?

e) From an environmental perspective, do you think that the (**enlarged**) EU makes a **positive contribution** for the Baltic Sea region?

f) How would you generally evaluate the **role of the EU** and the Commission (e.g. CAP)? Does the **EU enlargement** (& USSR breakdown) help in solving the problem?

g) Do you see any **conflicts between different levels of regulation**? (e.g. HELCOM and EU; national, regional, local etc.)

h) What role does **HELCOM** play? Why do you think is **agriculture** not a policy area discussed within HELCOM? What roles do **NGOs** play in HELCOM?

i) What is your opinion about the time limit set in BSAP, the WFD etc. for reaching good environmental status? Are they realistic?

j) Do you see the **regulatory process** concerning eutrophication more as a **top-down** (EU regulations) or **bottom up** process (more local, open and participatory) or something in between?

(do regulatory initiatives stem only from the **highest level authorities** like the EU or are lower **levels of governance** (*national, regional, local*) also important driving forces behind regulation?) ...& how should it be...?

- k) How does **cooperation between the local/ national/ regional level and the EU** perform? (e.g. assessments - reports - regulatory decisions about nutrient loads?)
- l) Which (policy/general) **developments** do you think are **central** in regulating eutrophication in the Baltic Sea region?
- m) How would you define the **role of your organization** in dealing with eutrophication?
- n) Does your organization work with **improving interaction and cooperation**? What do you do in order to facilitate cooperation and produce synergies?

3. Risk assessment and management

a) Does your organization perform its **own risk assessment** concerning eutrophication or do you rely on other sources?

b) If yes: **who performs** risk assessment in your organization and for **what purpose** (e.g. scientific research, assessment request, consultancy)? How is this activity **organized** in your organization?

c) If no: **From where** do you receive risk assessment information and how sophisticated and reliable do you regard this information?

d) What types of risk assessment procedures are used in regulating eutrophication in the BS and how do they relate to management? (e.g. NEST model/ HEAT analysis)

- Which risk **assessment activities are requested** by policy regulations? by managers? by your organization?

- Which risk **assessment is in place /implemented** (i.e. early warning, screening, formal risk assessments, concern assessments, scientific reviews, expert opinions/judgments etc)?

e) **What information** are you looking for? Are you working on **request** (e.g. for HELCOM; government)? What is the **information you need** in order to **identify appropriate management** decisions?

f) Do you think that the assessment and management of eutrophication **relates to other risks** in the Baltic Sea region – and if so: how?

g) Do you **cooperate with other organizations** for improving risk management concerning eutrophication and in what ways?

h) How does the **cooperation** (on risk assessment & management) between different the institutions (above under 2) and additional actors (e.g. NGOs) work?
(e.g. cooperation between scientific institutions giving advice on nutrient quotas and between the institutions in charge of regulating and controlling these quotas?)

i) Do **actors like NGO's** and industry have structural opportunities to make contributions to the risk assessment management of the Baltic Sea? How can they exert influence?

j) Do you think there are any **organizations acting hindering** a successful environmental governance of eutrophication in the BS?
(e.g. questions about nutrient discharges & status)? If yes, could you explain how?

4. Interactions and Coordination of Science and Management (WP2)

Introduction: Defining the problem; sources of eutrophication, i.e. is agriculture the main source? Are nutrient reduction quotas and adjacent time limits (as proposed in BSAP & EU directives) appropriate mechanisms to solve the problem?

BSAP: Contracting parties of HELCOM agreed to take actions to achieve a Baltic Sea in “good environmental status” by 2021; the result is reduction quotes for each country.

EU: Three directives: 1) Nitrates Directive (standards of manure spread on vulnerable zones → problems with implementation?); 2) Water Framework Directive (“good environmental status by 2021” as normative definitions? ; 3) Marine Strategy Framework Directive (assessment in 2012, coordinated programmes for measures in 2015)

a) In general do you think that the risk assessment activities are well organised in relation to risk management and regulation of eutrophication in the BS? Can you give examples?

b) Do you think that there is an overall **consensus** or are you aware of any scientific **disagreement** regarding the risk of eutrophication?

- *What level of consensus do you think is required for a collective action & decisionmaking?*

- *Consensus/disagreements on what (e.g. causes; severity; what to do?)*

c) If you state the latter: do the **disagreements concern the risk itself** or **methods** for dealing with it?

d) Are any **disagreements** manifest **within the scientific community**, between different stakeholder groups or perhaps between different countries?

e) How did you find out about it? Where and how is it visible?

f) What is your opinion about the **scientific uncertainties** concerning eutrophication? Can you give any examples?

g) How do you understand or **interpret uncertainties**? (e.g. natural consequence of the scientific process itself, a result of the complexity and unpredictability of dynamic ecosystems etc.)

h) How do you **cope with scientific uncertainty** and/or disagreement while dealing with the risk?

i) Do you have any specific **management options** for dealing with uncertainty?

j) What role do (purely) **scientific arguments** play when discussing management options for eutrophication? Are they **dominant** or do **other types of arguments** (e.g. economic, political) play a larger role?

In your work how much do you rely on **scientific assessment** in relation to **other sources of knowledge**? (e.g. *practical or local knowledge of stakeholders*)

k) How are **scientific arguments** used and evaluated? Do you **trust the scientific assessment** that is aiming to inform management measures?

EAM questions:

l) Are you familiar with the **Ecosystem Approach to Management** (EAM)? How would you briefly define it? Do you relate to it in your work? If so, how?

- m) Does your organization deal with it in any way?
- n) Do you see any major benefits with the EAM? Examples?
- o) Do you see any obstacles for the EAM? Examples?
- p) How do you perceive the role of the EAM over time (also in your organisation)? Has this role changed when the EAM has been implemented/ will be implemented?

5. Communication with and among stakeholders (WP3)

- a) How do you generally perceive the **communication with and among stakeholders**? Are all relevant actors invited and engaged enough?
- b) Do you think stakeholder communication and inclusion is **important**? If so, **why**? Should it be improved? If so, **why**?
- c) Are there any formal procedures or institutional arrangements for risk communication?
- d) Can you identify any **central institution or organization** in the **Baltic Sea region** with the responsibility of risk communication regarding eutrophication?
- e) You see **different national views** on the problem of eutrophication around the BS (differences in the public debates, environmental attitudes, awareness etc.)?
- f) What is the role of the media in this regard?
- g) Is **your organization involved** in risk communication? If so, which ways?
- h) **With whom** do you communicate (target groups)?
- i) **How** do you communicate? Which mediums do you use?
- j) What is the **information about** that you try to communicate?
- k) Do you communicate with the **wider public** in any way?
- l) Is there a need for public participation? (e.g. through hearings, consultation, consensus conferences etc.) Or more of it?
- m) Do you see any specific problems regarding risk communication activities at the time being?
- n) What could be done to improve risk communication activities?

Do you have any additional aspect, we didn't raised that you think is important?

APPENDIX 2

Descriptions of regulatory bodies, central conventions, governmental and non-governmental networks that have influence on the governance of eutrophication in the Baltic Sea on a) global, international, b) regional, international, c) European (EU), d) national, e) non-governmental levels.

The references are listed in connection with each organisation or network.

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International, global

ICES - International Council for the Exploration of the Sea

ICES - founded in 1902- is an intergovernmental organization dealing with coordination of research in the marine science field, mainly concentrated on the Atlantic Ocean and the North Atlantic (ICES, 2008a). It has 20 members which include the countries bordering the North Atlantic and the Baltic Sea as well as five other states defined as affiliate countries. The organization is led by the ICES Council. Two representatives from each member country sit in the council (ICES 2010a). The council 's duties are defined in *the Convention for the International Council for the exploration of the Sea* (from 1964) and are i.e. to promote research by organizing scientific studies and present results of scientific knowledge. The Convention sets the framework for how the work will be organized and by whom (ICES, 2010b). The mission of the organization is to expand the scientific knowledge of marine ecosystem and thereby to be an adviser in issues regarding how human activities affect the marine environment (ICES, 2010c).

There is an executive committee – the Bureau - and a secretariat located in Copenhagen. At present there are 53 people employed at the secretariat (ICES 2010c), some of them are experts in the field (ICES, 2002). A Science Committee reviews all the organizations scientific work. ICES are playing a significant role as an consultant for policy makers with advices based on scientific research (ICES, 2002). The Advisory committee is responsible for ICES scientific advice to different actors regarding marine issues, with the assistance of analyses done in different expert groups (ICES, 2010d).

ICES is described as a network for scientists. Over 1600 scientists are connected to the organization. An Annual Science Conference is being held every year. The research is funded mainly by the member countries (ICES, 2008a).

ICES have got more than 100 different study groups or expert groups dealing with different aspects in the marine field (ICES, 2010g). Some are dealing specifically with the Baltic Sea and some groups are dealing with eutrophication related issues. There seems not to be a group that is dealing with eutrophication in the Baltic Sea exclusively. Following groups/workshops are working among other things with eutrophication related issues.

A project called “Baltic Sea Regional Project (BSRP)“ has been defined as the main project dealing with Baltic marine issues. It was running between 2003 and 2007 with the aim to achieve a Baltic Sea with “sustainable biological productivity” by developing the ecosystem approach to management. The project was a cooperation between ICES, HELCOM, IBSFC (International Baltic Sea Fishery Commission; now closed) and the Swedish Univeristy of Agricultural Sciences (SLU). It was funded by a lot of different actors and countries and staffed by more than 70 employees (ICES, 2010e). The project stated eutrophication as the most serious threat to the Baltic Sea and that agriculture is mainly responsible for the problem. Due to this a part (or component) of the project called “Land and Coastal activities, C2” worked with these issues trying to increase the knowledge regarding ecologically sustainable agriculture measures by arranging seminars in Estonia, Poland, Russia and Lithuania for about 1200 farmers. A monitoring and assessment system was also established dealing with nutrient pollution from farms. The group also cooperated with WWF (also a financier of BSRP) in the work to restore wetlands in the Baltic States. However eutrophication was far from the only topic for BSRP. The project also worked a great deal with fish related issues and toxic substances in the Sea (Thulin, 2009). The project ended in

July 2007. However there are still Working- and Study Groups that were part of the project and that now continue their work (ICES, 2010f).

Another cooperation between ICES and HELCOM is the “Working Group on Integrated Assessments of the Baltic Sea” (WGIAB). The aim is to continue the work to develop Integrated Assessments that can be used as tools in the different basins of the Baltic Sea. Integrated Ecosystem Assessments have shown that the four investigated subsystem in the Sea have undergone Regime shifts in the ecosystem during the last decades. Eutrophication and fishery have, according to the assessments, been the main drivers to the changes in the marine environment. The group’s conclusion is that this sort of analyses seems to be appropriate for ecosystem – based assessments, especially when it comes to studies on eutrophication and fishing. The group will continue to refine the datasets and the analyses. Future goals (note, written in 2007) is to contribute to HELCOM’s vision of a “Baltic Sea unaffected by eutrophication” (ICES, 2007a, p.6) and to be assistant in the development of indicators for eutrophication and setting target levels for nutrients in the Baltic Sea. WGIAB have got a large database of marine data conditions that can be helpful in this work (ICES, 2007a)

There is also the “Study Group on Baltic Sea Productivity” (SGPROD). The group has investigated i.e. if there is any correlation between the presence of zooplankton and nutrient levels (ICES, 2008b).

Furthermore the “Study Group on Nutrients Standards” (SGONS). The intention is to work with and develop RMNS – Reference materials for nutrients in seawater- with a focus on nitrate, phosphate, nitrite and silicate. The aim is also to make contribution in the work to make nutrient data comparable in the different oceans (ICES, 2009).

ICES also arrange workshops. “Workshop co-sponsored by OSPAR on Time Series Data relevant to Eutrophication Ecological Quality Objectives” WKEUT is one of them, held in November 2005. The aim was to examine long-term data from American and European coast lines regarding nutrient levels and to work with Eutrophication Ecological Quality Objectives. Furthermore, to investigate any correlation between nutrient levels and i.e changes in primary production (ICES, 2006).

Another workshop was the “Workshop on Modelling of Predictive Eutrophication Status and Transboundary Nutrient Fluxes” WKPEST arranged in 2007, with the intention to evaluate models used by OSPAR that creates nutrient reductions scenarios and to give advice to OSPAR in their future assessments (ICES, 2007b).

References

ICES (2002) The ICES Action Plan, 2003–2007, Adopted by Council on 28 October 2002

<http://www.ices.dk/iceswork/actionplan.pdf>

ICES (2006), ICES Workshop on Time Series Data relevant to Eutrophication Ecological Quality Objectives, ICES WKEUT Report 2006, 11–14 September, Tisvildeleje, Denmark

ICES (2007a), Report of the ICES/HELCOM Working Group on Integrated Assessments of the Baltic Sea (WGIAB), 12-16 March 2007, Hamburg, Germany

ICES (2007b), Resolution for ICES Advisory Services, Reform of the ICES Advisory Programme <http://www.ices.dk/iceswork/recs/2007%20Resolutions/ACOM/ACOM%20resolutions%202007.pdf>

ICES (2008a) ICES strategic plan: *A vision worth sharing* <<http://www.ices.dk/iceswork/AVisionWorthSharing2008.pdf>>

ICES (2008b), Report of the Study Group on Baltic Sea Productivity, ICES SGPROD REPORT 2008, 22–25 January 2008, Riga, Latvia

ICES (2009), Resolutions SSGHIE/SSGHIE Resolutions 2009 <http://www.ices.dk/iceswork/recs/2009%20Resolutions/SSGHIE/SSGHIEResolutions2009.pdf>

ICES (2010a) ICES – About us – Our members <<http://www.ices.dk/aboutus/ourmembers.asp>> 2010-05-27

ICES (2010b) ICES – About us – Convention <<http://www.ices.dk/aboutus/convention.asp>> 2010-05-28

ICES (2010c) ICES – About us – What is ICES <<http://www.ices.dk/aboutus/aboutus.asp>> 2001-06-07

ICES (2010d) ICES – ICES Work - ACOM <<http://www.ices.dk/iceswork/acom.asp>> 2010-05-28

ICES (2010e) ICES –Projects <<http://www.ices.dk/projects/BSRP.asp>>2010-05-28

ICES (2010f) ICES – Projects – Projects <<http://www.ices.dk/projects/projects.asp#BSRP>> 2010-05-28

ICES (2010g) ICES – ICES Work – Expert groups < <http://www.ices.dk/workinggroups/WorkingGroups.aspx>> 2010-05-28

IMO – International Maritime Organization

IMO is an agency within the United Nation. The organization has 169 Member States, three associate members and is specialized to maintain and develop regulatory frameworks regarding international shipping. The first meeting took place at 1959, but the convention IMO is based on was adopted in Geneva 1948. IMO has it's headquarter in London and there are about 300 employees. (<http://www.imo.org/> 2010-05-31). From start IMO focused on safety at sea, but today regulations include environmental concerns, technical co-operations and legal matters and this is summarized in IMO's mission statement "Safe, Secure and Efficient Shipping on Clean Oceans" (<http://www.imo.org/> 2010-05-31).

The process of updating and developing new regulatory framework is divided into committees and sub-committees where meetings attended by intergovernmental organizations and NGOs take place. Environmental issues are treated mainly in Maritime Environment Protection Committee, MEPC but are aided by several sub-committees like Bulk liquids and Gases (BLG), Sub-Committee on Flag State Implementation (FSI) etc. The environmental vision of IMO is "to reduce to the barest minimum all adverse environmental impacts from ships" (<http://www.imo.org/> 2010-05-31).

Shipping's contributions to eutrophication are processed mainly in the MARPOL 73/78 Convention and then in Annex IV, Prevention of Pollution by Sewage by Ships and Annex VI, Prevention of Air Pollution by Ships. In Article 17 of the Convention, parties to the Convention accept an obligation to support other parties with technical assistance, training etc. if requested and in consultation with other international bodies and with assistance of UNEP (http://www.imo.org/conventions/contents.asp?doc_id=678&topic_id=258#11 2010-06-07).

Annex IV of MARPOL, Prevention of Pollution by Sewage by Ships

IMO wants with Annex IV of MARPOL dissolve problems of health hazards, oxygen depletion and visual pollution that occur in coastal areas when raw sewage from ships is discharged into the sea. Regulations regarding discharges, equipments on ships for control and treatment of sewage and also for ports and terminals to provide facilities for reception of sewages are therefore set in Annex IV (http://www.imo.org/Environment/mainframe.asp?topic_id=237 2010-06-01).

Annex IV, entered in to force 27 September 2003 since ratification by Norway 26 September 2002. Then 88 countries with a combined ship tonnage of 51 % of the world's total had ratified the Annex IV of MARPOL. Regulations are set about how sewage are controlled, treated and discharged on ships. Applied immediately to all new ships engaged in international voyages of 400 gross tonnages or certified for carry more than 15 persons and with 5 years respite to older ships within the same group. There are also requirements for Parties to the Convention to provide facilities for sewage receptions at ports. (http://www.imo.org/Newsroom/mainframe.asp?topic_id=583&doc_id=2524 2010-06-01).

An amendment of the Annex IV was adopted 1 April 2004 and was taken into force 1 August 2005. This amendment prohibits ships mentioned above to discharge sewage into the sea nearer land than 12 nautical miles. Ships with an approved sewage treatment plant or comminuted and disinfected sewage are prohibited to discharge sewage nearer land than three nautical miles (http://www.imo.org/conventions/contents.asp?doc_id=678&topic_id=258#2004sewage 2010-06-01).

Annex VI of MARPOL, Prevention of Air Pollution by Ships

IMO started to work with air pollution originated from ships fuel combustion in the mid 1980s and in 1988 the issue was included in the work plan since Norway and ministers of North Sea states had raised the question and where the Second International Conference on the Protection of the North Sea 1987 played an important role. Upon a resolution from the IMO assembly 1991, MEPC drafted a new annex to the MARPOL Convention and this was adopted at a Conference in September 1997 and was entered into force on 19 May 2005 (http://www.imo.org/Environment/mainframe.asp?topic_id=233#annexvi 2010-06-02).

Annex VI sets regulation about sulphur content of fuel and cleaning systems from engines so that emissions of Sox should be limited. Provisions of "SOx Emission Control Areas", SECAs, are set and allow specific areas to have stricter requirements for SOx emissions. The Baltic Sea Area was designated as a SECA at start but with a 12 months respite before regulations entered into force. Limitations of NOx emissions for diesel engines are set and a mandatory NOx Technical Code will ensure that diesel engines in ships comply with the regulations. Annex VI also content regulations about ozone-depleting substances, incineration of PCBs and a Greenhouse gas policy (http://www.imo.org/Newsroom/mainframe.asp?topic_id=1018&doc_id=4884 2010-06-02).

Amendment to Annex IV was adopted at MEPCs 58th session in 2008 and content agreement to progressive reductions in SOx and NOx emissions. The amendment also allows establishment of designated Emission Control Areas where ships emissions of SOx and particulate matter or NOx will be reduced and controlled. Emissions Control Areas is proposed by a Party to the Annex and then IMO take the demonstrated need for protection under consideration before adoption (http://www.imo.org/Environment/mainframe.asp?topic_id=233 2010-06-07).

International , regional

HELCOM – The Helsinki Commission

HELCOM – the Helsinki Commission- is a permanent body whose main role is to supervise the implementation of the Helsinki Convention, first signed in 1974 and revised in 1992. The Commission's task is to counter the different sorts of substances that pollute the water in the Baltic Sea caused by human activities. This is supposed to be done through intergovernmental cooperation between the Contracting parties of the Convention, which are Estonia, Denmark, Finland, Latvia, Germany, Lithuania, Russia, Poland, Sweden and the European Community. This means that all the countries bordering the Baltic Sea are involved in the work. The aim is to reach a good and well-balanced ecological, marine status in the Sea. The work shall be based on the following six principles: *Responsibility* (for the Contracting parties to work actively with all possible measures to prevent discharges of pollutions), *The precautionary principle*, *Best Environmental Practices and Best Available Technologies*, *The polluter pays principle*, *Monitoring* and *Avoiding risks* (HELCOM, 2010a). HELCOM notes that eutrophication is the most serious problem in the Baltic Sea (HELCOM, 2009).

HELCOM has a wide field of activities and duties, for example to monitor and evaluate the marine environmental status in the Baltic Sea as well as to review the work of the Contracting parties to fulfill their commitments. A Commission meeting is held once a year. A very important task is to decide on recommendations that the contracting parties are expected to follow and implement in national law. Approximately 200 recommendations have been adopted since the early 1980s (HELCOM, 2010a). However, far from all have been implemented by all the Contracting parties. It was noted in the Commission meeting in Bremen, June 2003 that from 1998 to 2003 only a few recommendations had been implemented completely by all states represented in HELCOM (HELCOM 2003a). Regarding eutrophication, HELCOM has adopted both recommendations concerning the need to limit the pollution of phosphorous and nitrogen from agriculture, industry and municipal wastewater treatment plants as well as the emissions from other sources such as for example ships (HELCOM, 2009).

A delegation from each contracting state with representatives and experts shall be represented in the Commission. The chairmanship of the Commission circulates every two years among the countries involved. In addition to the commission meeting, a ministerial meeting shall be arranged every three years and a Heads of Delegation meeting shall be held twice a year. The task of the latter is *i.e.* to be a supporting agency to the Commission; both to make proposal to the Commission and to execute the tasks initiated by the Commission. The Heads of Delegation also have a supervisory role as it will ensure that the policies made by the Commission are implemented. The meetings of the Heads of Delegation are intended to promote cooperation with NGOs and are therefore open for one representative from each organization, provided that the Commission has given the organization in question observation status. NGOs with observation status (*e.g.* WWF, CCB) are also welcome at the meetings of the subsidiary bodies of commission, established by the Heads of Delegation (HELCOM, 2010b).

Cooperation - not just among the contracting parties within HELCOM but also with other stakeholders – is considered to be a crucial factor for success. This view was for example presented in the HELCOM Ministerial Declaration (or the Bremen Declaration) where it was stated that co-ordination and co-operation among different actors and regulations in the field

is, and will be even more important in the future. It was also agreed upon that among other things the ecosystem approach would be a priority topic. With regard to the eutrophication of the Baltic Sea there was also a concern expressed that while an increasing number of states are becoming members of the EU, the Baltic Sea may be affected in a negative way due to the EU Common Agricultural Policy (HELCOM, 2003b).

Main working groups

There are five main working groups within HELCOM; HELCOM LAND, HELCOM RESPONSE, HELCOM MARITIME, HELCOM MONAS and HELCOM HABITAT. They are responsible for different aspects in the work of protecting the Baltic Sea from all sorts of pollution (HELCOM, 2010c).

HELCOM LAND is a highly relevant group for the eutrophication case study because it deals with the land-based pollution from point- and diffuses sources. Their task is to identify these sources and make suggestions how to reduce the emissions and to stress the use of Best Environmental Practices and Best Available Techniques as defined in the Helsinki Convention from 1992 (HELCOM, 2010d). They also evaluate the most cost-effective way of addressing the problem of pollution sources in different areas around the Baltic Sea. Another task linked to eutrophication is the issue of airborne nitrogen. HELCOM LAND is responsible for identifying sources of nitrogen and to make suggestions on solutions of the problem. The group is also responsible for evaluating how the agricultural policies in different countries are influencing the problem and how important the EU Common Agricultural Policy is for the situation. Scenarios are used to evaluate the outcome of different possible policy decisions (HELCOM, 2010e). Until 2003 there were over 40 recommendations linked to the HELCOM LAND group dealing with demands to reduce discharges from industries, municipal waste water treatment plants, agriculture- and the transport sector. The HELCOM LAND group is expected to monitor that these recommendations are implemented. The recommendations are of course not static but have been changed with time due to HELCOM's aim to harmonize them with relevant EU-legislations and OSPAR requirements. This is said to be done to avoid overlaps "in the reporting" and get a better overview of the implementation status (HELCOM, 2003a).

HELCOM MONAS (Monitoring and Assessment Group) is also an important group in this context. The group has a coordinative function as it coordinates the monitoring programmes and the development of indicators. (Further more, the work to develop HELCOM Ecological Objectives was coordinated by HELCOM MONAS). The main task is however defined to assess the current problems threatening the marine environment and review how they affect the status of the marine environment. Further, their task is to evaluate how effective the actions are that are taken to reverse the trends. The assessments are supposed to be targeted and timely. The work by HELCOM MONAS is considered as the base for the other main working groups and supplementary measures can be decided on due to this work. The other main groups as well as projects and ad hoc groups are supplied with relevant information from HELCOM MONAS regarding certain areas affected by problems. These other groups are expected to inform HELCOM MONAS about their demands for monitoring and their own possibilities for monitoring and assessments (HELCOM, 2010k).

HELCOM MARITIME is working to prevent both accidental as well as deliberate discharges of pollution from ships. The group oversees that regulations are followed and works efficiently. Thus, it is on their agenda to identify and promote new actions to decrease pollution when they consider it necessary. HELCOM MARITIME cooperates with for

example IMO (HELCOM, 2010l). One of the activities of the group is to be a help in the work to bring about a joint submission from the Contracting parties to IMO regarding making the Baltic Sea a NO_x emission control area (HELCOM 2010m).

Projects

Different projects are sorted under the five main working groups to deal with specific issues. These projects are time-limited with clear, explicit goals and are funded either by HELCOM, the Contracting parties or by another actor (HELCOM, 2010f).

PURE project (Project on Urban Reduction of Eutrophication)

The project, sorted under HELCOM LAND (HELCOM, 2010g), is financed to some extent by the EU. The goal is to remove phosphorus from sewage treatment works so that the level of phosphorus in the outgoing water reach the recommendations by HELCOM Baltic Sea Action Plan (PURE, 2010a). The intention is to focus on five wastewater treatment plants that are old and needs an update and support them to improve their standard. The goal is to find out the most cost-effective way of doing so which demand a close study of each of the selected wastewater treatment plants to find out the right course of action in each individual case. The selected wastewater treatment plants are Jūrmala in Latvia, Brest in Belarus, Szczecin and Gdańsk in Poland and Kohtla-Järve in Estonia. The PURE project will assist with equipments for phosphorus reducing measures (PURE, 2010b). The project is also involved in new techniques concerning wastewater sludge that contains high amounts of phosphorus as well as other chemicals that are used in the process of reducing phosphorus from the water. It is therefore of upper importance that this sludge is prevented from reaching some watercourse. PURE is therefore engaged in the development in this area and have developed a cooperation with partners such as wastewater treatment plants. PURE's contribution is to spread information among partners about new technique concerning wastewater sludge treatment (PURE, 2010c)

The Baltic Sea Joint Comprehensive Environmental Action program (JCP)

JPC is a highly prioritized project within HELCOM sorted under the HELCOM LAND group. The idea is to list active pollution "Hot spots" in the regions bordering the Baltic Sea and to support the Contracting parties in their work to reduce the amount of discharges. JPC continually evaluates the status of the "Hot spots" and update the list. These "Hot spots" are defined both as point sources like - industries or municipal waste water treatment plants - and for example large agricultural areas that are defined as more diffuse sources (HELCOM, 2010h). JCP promotes specific strategies as action steps. Originally, 132 "Hot spots" were chosen in 1992. These were selected on the basis of environmental concern and human health but also with economic aspects in mind. In the selection procedure both scientists, environmental managers, engineers, representatives from the different countries and bankers were involved in an international group (HELCOM, 2010i). Along with the implementation of the JPC, HELCOM has perceived a change in attitudes where environmental considerations have become stronger arguments in decision-making than before. They also indicate that legislation and policies like WFD, the Integrated Pollution Prevention and Control Directive and the Urban Waste Water Directive are tools that can be helpful in the process (HELCOM, 2010j)

Baltic Compass (Comprehensive Policy Actions and Sustainable Solutions for Agriculture in the Baltic Sea Region)

Baltic Compass aimed at governments, authorities and other actors with the opportunity to influence the way land is used in the region around the Baltic Sea. The project notes the

uneven distribution, especially between east and west, of competence, policies and technology that can lead to a more sustainable way of handling things. This is defined as a transnational problem and a challenge that the project is intended to deal with. Baltic Compass has 23 partners from different interest organizations, authorities and research institutes from all the countries bordering the Baltic Sea that work together to promote the use of best practices, for more comprehensive investments regarding environmental technologies and a more strengthening governance. The intention is also to promote that the region will be considered a “*pilot region for innovative solutions related to combating eutrophication*”. The partnership will i.e. do pilot investments in improved management of nutrients on farms (HELCOM, 2010n). The project is sorted under HELCOM LAND (HELCOM, 2010g).

Balthazar project

The project's main goal is to work to protect the Baltic Sea from hazardous waste and from nutrients leakage from agriculture. The approach is to assist with the development of action plans on national level and by being a support in the process of prioritizing necessary steps of action. The focus is explicitly on Leningrad, St. Petersburg, and Kaliningrad Oblasts of the Russian Federation. The project aimed both at the authorities in the Russian Federation dealing with agriculture, natural resource management environment and regional development as well as on regional and local level. Departments and committees working with water resources, the protection of environment and agriculture on regional and local level are included. Other stakeholders such as for example NGOs, agricultural companies and the public are also considered as target groups. The strategy is to enable improved management by open up for more dialogue between the agricultural sector and the environmental. Campaigns that involves the different stakeholders; both the relevant authorities, NGOs and companies are arranged. A focus area is a proper manure handling in cattle, pig and poultry farms (HELCOM, 2010o).

Fifth Baltic Sea Pollution Load Compilation (PLC-5), (2005-2010)

The Baltic Sea Pollution Load Compilation is one of the on-going projects by HELCOM MONAS and HELCOM LAND. Currently the fifth Pollution Load Compilation is under production. It is a compilation, produced on a regular basis that assesses the Baltic Sea's total amount of the waterborne loads of nutrients (the compilation also includes some types of hazardous substances). The data used are collected by the member states. Main objectives are to examine changes since 1994 and describe to what extent humans are responsible for the changes and what can be explained as natural variations, to quantify the amounts of nutrients that are reaching the Baltic Sea from different point -and non-point sources (using both source-oriented and load oriented approach) and to describe this processes. Further more, to examine how effective different actions to reduce the amounts of pollution from land reaching the sea actually are (HELCOM, 2010p).

Assessments

The assessments of the eutrophication status made by HELCOM are based on coordinated monitoring by the Contracting parties (HELCOM, 2009). As mentioned above, HELCOM use models, inter alia, to predict the outcomes of different scenarios regarding policymaking linked to the use and discharges of nutrients. The NEST model (<http://nest.su.se/nest/>) is a useful tool in this context. The aim is to find out the most cost-effective way of proceeding in different geographic areas. HELCOM cooperates with other actors such as for example EMEP (European Monitoring and Evaluation Programme) - a partnership that began as early as 1996. For example in 2005 EMEP was asked to examine and assess changes in the amounts of atmospheric nitrogen deposition in a project called “Assessment of implications of different

policy scenarios on nutrient inputs”. The purpose was to collect these results in order to evaluate the changes of nitrogen and how they were consistent with the achievements in reaching the targets set in the Gothenburg protocol and the NEC-directive. HELCOM wrote: *“The results hereof should be used as input to the updating of the programmes under the EU NEC Directive in the Member States in 2006 and for proposals for possible modifications to the EU NEC Directive in 2008 (as well as in the revision of the Gothenburg Protocol).”* (HELCOM, 2006 p.8). HELCOM promotes joint actions between the Contracting parties to influence other actors to impose stricter targets in legal documents. This is evident in the Baltic Sea Action plan adopted in 2007 (HELCOM, 2007).

The ecosystem approach

Since 2003 HELCOM works with a new concept – the ecosystem approach. It was adopted by the HELCOM and by the HELCOM Ministerial Declarations and the joint HELCOM/OSPAR Ministerial Declarations. In order to start the implementation a HELCOM project dealt with definitions of what good ecological status in the Baltic Sea actually means. Linked to this, the project defined HELCOM’s vision, different goals as well as ecological objectives. The project was guided by experts that together formed working groups. Eutrophication is one of HELCOM’s strategic goals which indicate that it’s a problem that needs special attention due to the seriousness. The main goals were adopted by HELCOM in 2006 along with the ecological objectives. The latter means definitions of what a healthy sea is. A wide range of different scientists and experts were involved in the work (Backer & Leppänen, 2007).

The Baltic Sea Action Plan - BSAP

The Baltic Sea Action Plan (BSAP) was adopted in 2007 by the Contracting parties of HELCOM and the European community. It is an ambitious plan with the aim to solve all serious environmental problems in the Baltic Sea where eutrophication is considered to be the most severe problem of them all. The main goal with the plan is that by the year 2021 the Baltic Sea will be in a “good environmental status”. The work should be permeated by the ecosystem approach to management that view the problem in a holistic perspective. The intention is to harmonize the activities and efforts of the Contracting parties to achieve the goals and to promote the use of common assessments tools (HELCOM, 2009). The latter is of great importance in order to assess nutrient loads from diffuse sources. HELCOM therefore promotes development of HEAT - HELCOM eutrophication assessment tool (HELCOM, 2007).

A working group of representatives from the Contracting parties as well as a wide variety of other actors; both governmental and non-governmental organizations but also financial institutions on the international level were involved in the development of actions in the plan. The Contracting parties and the European commission actively participated in the final negotiations, while other actors were invited as observers (Backer et al., 2009).

Earlier targets made by HELCOM to reduce the inputs of nitrogen and phosphorus from land activities (land-based) by 50 percent have been changed due to the BSAP and the implementation of the ecosystem approach. The aim now was instead to create targets that will directly lead to success in reaching the main goal of good ecological status in the Baltic Sea. In the process the status of the ecosystem is compared, by a set of chosen indicators, to the targets that represent the favorable status of the marine environment. With the BSAP, HELCOM took the first step to implement the ecosystem approach to practice (Backer and

Leppänen, 2008). In addition to environmental concern, the plan also emphasizes the importance of economic as well as social sustainability by advocating cost effectiveness and cost benefits as guiding principles in the selection of measures (HELCOM, 2007).

HELCOM has agreed upon five “ecological objectives” that the Commission has decided to be significant with a healthy Baltic Sea not affected by eutrophication. The primary objective has been decided to be “clear water”. The indicator for this objective is water transparency. In the plan, different nutrient reduction targets are set for each of the seven sub-basins of the Baltic Sea. There is also a target for the entire sea. The Contracting parties have all agreed on phosphorus and nitrogen reduction requirements which differ between the various countries involved. The maximum ecologically sustainable levels of nutrient inputs in the whole Baltic Sea is estimated to be 600 000 tons of nitrogen and 21 000 tons of phosphorus. The deadline for the Contracting parties to take actions to reduce nutrient inputs is the year 2016 (HELCOM, 2007).

The Nest model (<http://nest.su.se/nest/>) was used to estimate the extent of the nutrient reduction needed. It was also used to create scenarios to evaluate the effectiveness in reaching the target of clear water if HELCOM recommendations and EU directives and programs were implemented by all the Contracting parties. The data used as a base in the Nest model is information regarding levels of the average nutrient load between the years 1997 and 2003 and the maximum allowable nutrient loads during the same period. Although all the Contracting parties are committed to specific targets to reduce their nutrient pollution, each country can choose their own management strategy to reach the targets, based for example on cost-efficiency. (HELCOM, 2009) However, the plan suggests some cost-effective ways of reducing phosphorous (HELCOM, 2007).

The BSAP points out that the targets are based on current knowledge and therefore provisional and shall be periodically evaluated and if it's proved necessary – revised. HELCOM's monitoring and assessment program will according to HELCOM be a very important tool in this matter. In addition to increasing the overall knowledge in the field, the program has an important function in proposing supplementary measures. (HELCOM, 2007). HELCOM states that for example the effects of climate change may cause such negative impact on the eutrophication status that the agreed targets in the BSAP have to be reconsidered and strengthened (HELCOM, 2009).

The plan contains specific recommendations for the Contracting parties to follow. For example recommendation 28E/7 to stop using phosphorous in detergents and recommendation 28E/5 which means greater demands on municipal wastewater treatment. Recommendation 28E/6 is also relevant in this context, dealing with wastewater treatment on a smaller scale for i.e single family homes (HELCOM, 2007).

As the plan considers agriculture to be the main input source of nitrogen and phosphorus in the Baltic Sea, recommendation 28E/4 was agreed upon, dealing with measures to prevent the pollution of nutrients from agriculture. Further, it is pointed out in the recommendations that the Contracting parties, in their efforts to reduce the amount of nutrients from the agricultural sector, shall use the Best Available Technology and Best Environmental Practice. The Baltic Sea Action Plan set up a number of requirements linked to agriculture that each of the Contracting Parties are intended to follow and develop national guidelines for i.e animal density and Construction of manure storage (HELCOM, 2007). However, the plan deals with *recommendations* instead of *strong commitments* on how to for example decrease the use of nutrients in agriculture (Backer et al., 2009).

In addition to the recommendations and actions the BSAP also promotes joint actions to influence other political documents and programs such as EU's agricultural policy.

The Baltic Sea Action plan also deals with the issue of airborne sources of nitrogen. The scenarios made by HELCOM shows that target levels set in agreements, like for example the Gothenburg Protocol, are not sufficiently stringent and therefore the Contracting parties should try to influence these other organizations to adopt more strengthened targets. Those countries that are both members of EU and HELCOM have in the BSAP agreed on working for changes of the EU Directive 2001/81/EC regarding emissions of nitrogen. Furthermore, all the Contracting parties will operate for updated guidelines by IMO concerning discharges from ships. The intention is to make a joint proposal for revision of Annex IV of the MARPOL 73/78 convention with the aim to eliminate emissions of sewage water from ships (HELCOM, 2007).

HELCOM concluded in the report *Eutrophication in the Baltic Sea – an integrated thematic assessment of the effects of nutrient enrichment in the Baltic Sea region*, (HELCOM, 2009) that even though reductions in terms of nutrient discharges have been made there is still a need for increased efforts to reduce the pollution and reverse the eutrophication trend. Implementation of HELCOM recommendations, action plans at national level is essential but HELCOM also stress the importance of other documents; for example the Marine Strategy Framework directive and the Urban Waste Water Treatment Directive, Water Framework Directive and Nitrates Directive on EU-level that are legally binding for the European Union member states to comply (HELCOM, 2009). The BSAP are closely linked and in many ways similar to these EU-directives and the plan is considered to be a pilot for the Marine Strategy Framework Directive (Backer et al., 2009). As a useful complement to BSAP and the EU directives, mentioned above, and with the intention to create a synergistic effect in the work, HELCOM plans to initiate a “Baltic Sea-wide nutrient management strategy”. Following quotation is from HELCOM 2009 Eutrophication in the Baltic Sea ...*“It is further recommended to develop a Baltic Sea-wide nutrient management strategy covering both open and coastal waters that is parallel to the implementation process of the BSAP and relevant EU directives. This would result in the ‘convergence’ of the implementation of the instruments, creating a synergism in this work* (HELCOM, 2009 p.13).

The HELCOM Moscow Ministerial Meeting, May 2010

A HELCOM Ministerial Meeting was held in Moscow the 20th of May for all the Ministers of Environment of the Contracting parties. The intention with the meeting was to talk about the status of the Baltic Sea and to present the countries respective implementation program to see how far the different member states had come to take actions for reaching the objectives set in the Baltic Sea Action Plan. Further goal with the event was for the Contracting parties to present future actions in order to curb the eutrophication trend (HELCOM, 2010q). However, the meeting was to some extent a disappointment due to that many of the member states' implementation plans were incomplete. The plans were supposed to be submitted before the meeting, so that they could be evaluated at the Moscow meeting, but in many cases they were not (DN, 2010).

Follow-up actions, some of them stated below, were agreed on by the Ministers at the meeting (HELCOM, 2010q); The Ministers agreed on increased efforts in the work to fight eutrophication and noted that although there have been large reductions in the loads on nutrients the last thirty years, the Baltic Sea is to a wide extent affected by eutrophication. This is the conclusion of the latest assessment made by HELCOM. It was decided on

development of indicators and quantitative targets for all the segments of the Baltic Sea Action Plan, indicators that also can be used for example in the EU Marine Strategy Framework Directive. Currently a core set of indicators are being developed in the HELCOM CORESET and HELCOM TARGEV projects (the latter is financed partly by the Nordic Council of Ministers). Regarding **wastewater treatment** it was agreed on exchanges of information on new knowledge of best available techniques. Regarding **agriculture** there was inter alia an agreement to go through the list with “Agricultural Hot Spots” that has been developed in the Joint Comprehensive Environmental Action program and to continue the work to investigate other areas which may cause extensive pollution in the sea. Risk assessments on large animal farms regarding nutrient leakage shall be performed in order to evaluate the right investments and measures. It was also agreed on an exchange of information and experiences between the Contrasting parties regarding best practices in this area, for example concerning manure handling. A HELCOM Agricultural/Environmental Forum will be established by 2010 so that agricultural and environmental authorities can meet, exchange information and work together. It also enables coordination with the work under the EU Strategy for the Baltic Sea Region. When it comes to **Atmospheric emissions of nitrogen** it was agreed on to “*make a joint input to the ongoing parallel revision process of the Gothenburg Protocol under the UN ECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) and the revision of the EU National Emissions Ceilings Directive (NEC Directive 2001/81/EC) to ensure that the health of the marine environment, especially the nutrient load reduction targets designated to reduce eutrophication of the Baltic Sea, will be continuously taken into account in the elaboration and implementation of new regulations*” (HELCOM, 2010r, p.8). Further, the Ministers decided on a stop of **phosphorus to be used in laundry detergents** by at the latest 2015 and to encourage a voluntary stop of the same substance in dishwater detergents. Another agreement was to work for that the Baltic Sea will be classified as a **NO_x Emission Control Area** (HELCOM, 2010b). This would result in strengthening of international regulations concerning emission from ships (HELCOM, 2010q). A joint proposal to IMO will be submitted, preferably by 2011.

References

- Backer, H., Leppänen, J-M., 2008.** The HELCOM system of a vision, strategic goals and ecological objectives :implementing an ecosystem approach to the management of human activities in the Baltic Sea. Aquatic Conservation: Freshwater and Marine Ecosystems 18, 321-334
- Backer, H., Leppänen, J-M., Brusendorff, A. C., Forsius, K., Stankiewicz, M., Mehtonen, J., Pyhälä, M., Laamanen, M., Paulomäki, H., Vlasov, N., Haaranen, T., 2009.** HELCOM Baltic Sea Action Plan – A regional programme of measures for the marine environment based on the Ecosystem Approach. Marine Pollution Bulletin 60, 642-649.
- DN (2010).** Dagens Nyheter: Många försenade Östersjöplaner, 2010-05-20 <http://www.dn.se/nyheter/varlden/inga-bindande-vergodsningkrav-1.1108773>
- HELCOM (2003a).** Compliance with the Requirements of the Convention and HELCOM Recommendations. Baltic Marine Environment Protection Commission 24th Meeting, Bremen, Germany, 25 June 2003
- HELCOM (2003b).** HELCOM Ministerial Declaration (adopted by the HELCOM Ministerial Meeting on June 2003) <http://www.helcom.fi/stc/files/MinisterialDeclarations/Bremen2003.pdf>
- HELCOM (2006).** Estimation of Atmospheric Nitrogen Deposition to the Baltic Sea in 2010 based on agreed emission ceilings under the EU NEC Directive and the Gothenburg protocol. <<http://www.helcom.fi/stc/files/Publications/OtherPublications/2010NitrogenDeposition.pdf>>

HELCOM (2007). HELCOM Baltic Sea Action plan (adopted by the HELCOM Ministerial meeting in Poland 2007)

HELCOM (2009). Eutrophication in the Baltic Sea – an integrated thematic assessment of the effects of nutrient enrichment in the Baltic Sea region. Baltic Sea Environment Proceedings No. 115B

HELCOM (2010a). About HELCOM <http://www.helcom.fi/helcom/en_GB/aboutus/> 2010-05-01

HELCOM (2010b). About HELCOM – Rules – Procedure <http://www.helcom.fi/helcom/rules/en_GB/procedure/> 2010-05-01

HELCOM (2010c). Groups <http://www.helcom.fi/groups/en_GB/groups/> 2010-05-01

HELCOM (2010d). Groups- LAND <http://www.helcom.fi/groups/LAND/en_GB/main/> 2010-05-02

HELCOM (2010e). Groups-Land-Working Programme <http://www.helcom.fi/groups/LAND/en_GB/WP/> 2010-05-07

HELCOM (2010f). Projects <http://www.helcom.fi/projects/en_GB/projects> 2010-05-07

HELCOM (2010g). Projects http://www.helcom.fi/projects/on_going/en_GB/cover/# 2010-07-05

HELCOM (2010h). Projects – Joint Comprehensive Environmental Action Programme <http://www.helcom.fi/projects/jcp/en_GB/pitf/> 2010-05-07

HELCOM (2010i). Projects – Joint Comprehensive Environmental Action Programme – Hot Spots <http://www.helcom.fi/projects/jcp/hotspots/en_GB/hotspots/> 2010-05-07

HELCOM (2010j). Projects – Joint Comprehensive Environmental Action Programme – Progress in implementation <http://www.helcom.fi/projects/jcp/en_GB/progress/> 2010-05-07

HELCOM (2010k). Groups-MONAS <http://www.helcom.fi/groups/monas/en_GB/monas_main/> 2010-07-05

HELCOM (2010l). Groups-MARITIME <http://www.helcom.fi/groups/maritime/en_GB/main/> 2010-07-05

HELCOM (2010m). Groups-MARITIME-Working Programme <http://www.helcom.fi/groups/maritime/en_GB/wp/> 2010-07-05

HELCOM (2010n). Projects-On going HELCOM projects-Baltic Compass <http://www.helcom.fi/projects/on_going/en_GB/BalticCOMPASS/> 2010-07-05

HELCOM (2010o). Projects-Balthazar <http://www.helcom.fi/projects/en_GB/BALTHAZAR/> 2010-07-05

HELCOM (2010p). Projects-On going HELCOM projects-5th Baltic Sea Pollution Load Compilation <http://www.helcom.fi/projects/on_going/en_GB/plc-5/> 2010-05-07

HELCOM (2010q). Pressoffice-HELCOM news <http://www.helcom.fi/press_office/news_helcom/en_GB/Moscow_Ministerial_Meeting_2010/> 2010-07-04

HELCOM (2010r). HELCOM Ministerial Declaration on the implementation of the HELCOM Baltic Sea Action Plan, 20 May 2010, Moscow.

PURE (2010a). <<http://www.purebalticsea.eu/index.php/pure:home>> 2010-05-07

PURE (2010b). Wastewater treatment <http://www.purebalticsea.eu/index.php/pure:wastewater_treatment> 2010-05-07

PURE (2010c). Sludge handling <http://www.purebalticsea.eu/index.php/pure:handling_of_sludge> 2010-05-07

OSPAR – The Oslo-Paris Convention

The OSPAR Convention from 1992 is an extended unification of the Oslo Convention 1972 and the Paris Convention 1974 which aim to protect the marine environment of the North-East Atlantic. It is a regional convention, entered into force in 1998, and contracting parties are Governments of Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the European Community (http://www.ospar.org/content/content.asp?menu=00340108070000_000000_000000 2010-06-17).

The OSPAR Commission has annual meetings and is supported by six main committees, where the Eutrophication Committee, EUC, is one of these main committees (http://www.ospar.org/content/content.asp?menu=00360108090000_000000_000000 2010-06-17). OSPAR has a close cooperation with HELCOM since both are Regional Management Organizations and works within UNEP Regional Seas Programme (http://www.ospar.org/content/content.asp?menu=00120000000042_000000_000000 2010-06-17). In a ministerial meeting in Bremen (Germany) 2003, OSPAR and HELCOM made a jointly statement named “Towards an Ecosystem Approach to the Management of Human Activities”. This contains agreement in monitoring nutrient loads to the marine environment (http://www.ospar.org/content/content.asp?menu=00180302000066_000000_000000).

The Nordic Council – The Nordic Council of Ministers (NMR)

The Nordic Council and the Nordic Council of Ministers are part of the so called “official co-operation in the Nordic Region”. It is based on common values and “a willingness to achieve results that contribute to a dynamic development and increase Nordic competencies and competitiveness”. The countries involved are: Denmark, Island, Finland, Norway, Sweden, the Faroe Islands, Greenland and Åland (Norden, 2010a).

The Nordic Council, established in 1952, is a forum for parliamentarians from the Nordic governments. At their annual autumn meeting (the Session), decisions are made on what issues that are important to for the Nordic governments to focus on. The 87 members of the Council work both in committees and party groups. The Secretariat is located in Copenhagen, in the same premises as the Nordic Council of Ministers’ secretariat. There are also secretariats in respective country (Norden, 2010b). There are five specialists committees that work with issues in different fields and that are responsible for nearly all policy matters. One of them is for example the Environment and Natural Resource Committee responsible for environmental issues in the Nordic countries. After a committee receives a proposal from one or several members in a group they take it under consideration (the committee might for example send it to experts in different countries before they make a decision). A proposal from the committee is then sent to the Presidium (the executive body) or the Session where it is finally decided on a recommendation that shall be made to the Nordic Councils of Ministers or the governments in the Nordic countries (Norden, 2010c).

The Nordic Council of Ministers, founded in 1971, is a co-operation between the Nordic governments. It is a forum for representatives from the governments of the countries involved in the co-operation. It consists, despite of the name, actually of ten different policy councils of ministers and a council of ministers with a coordinative function (norden 2010a). The ultimate political responsibility for the environmental cooperation lies on the Environments Ministers

in respective country or autonomous territory. They sit in the Nordic Council of Ministers for the Environment (MR-M). The Committee of Senior Officials for the Environment, under the MR-M, is responsible for the implementation of the so called *Environmental Action plan* (described below), with the help from an Executive committee. The practical aspects of implementing the Environmental Action Plan lie on different working groups and is done mostly in a project cooperation form. Experts from authorities and administrations in the Nordic cooperation are participating in the working groups but the intention is to widen the working groups so that different stakeholders can participate. The coordinative position with the task to coordinate the different levels is held by the Nordic Council of Ministers' Secretariat (NMRS). A vision is that the Nordic countries will be leading in environment issues and that other countries can benefit from their experiences (Environmental Action plan, 2009-2012). HELCOM, the Arctic Council and the Barents Council are seen as important partners when it comes to environment issues on an international level (Norden, 2010d).

The Working group for Aquatic Ecosystem (AEG) is one of the groups under the Nordic council of Ministers for the Environment. The group's intention is give support to projects that contribute to increased scientific knowledge and a joint basis in efforts for the Nordic countries regarding marine and coastal environmental issues. Eutrophication is one of the focus areas as the group shall work according to the Environmental Action plan where it is a prioritized subject. The group meets twice a year to discuss priority areas and project applications (Norden, 2010e). Prioritized projects for 2011 that involves eutrophication are projects that evaluate the climate changes effects on the nutrient levels in the Nordic Seas such as: to increase knowledge of correlation between climate change, biodiversity and eutrophication in marine environments and to further develop models and methods for monitoring. Results from the projects are actively distributed to scientists and different decision making bodies by the working group (Norden, 2010f).

Current projects relevant for eutrophication that are given financial support are:

EUTRO2010. The Nordic Council (through AEG) is along with organizations such as for example BONUS, HELCOM, OSPAR and ICES sponsor of the International Symposium EUTRO2010 (EUTRO2010, 2010) which aim is to discuss different aspects of eutrophication (i.e management strategies, new knowledge, improvements of monitoring assessments) and with the explicit goal to promote better dialog and understanding regarding these issues between managers and scientists (the Nordic council of Ministers' project database)

A Baltic and North Sea Model Eutrophication Assessment in a Future Climate (ABNORMAL) is a project that involves scientists from Denmark, Finland, Norway Russia and Sweden with the goal to assess the eutrophication status now and in the future in the North Sea and the Baltic Sea. The status will be evaluated by the same indicators used by HELCOM and OSPAR (the Nordic council of Ministers' project database).

Betydning af eutrofiering og klima for udbredelsen af ålegræs (Zostera marina L.) i Østersøen. The project aims to contribute to the harmonization of environmental assessments requested by HELCOM and EU (in the Water Frame Directive). The intention is to "develop a geographically robust empirical model for the relationship between eutrophication and a biological quality indicator, the depth range of eelgrass" (quoted from the Nordic council of Ministers' project database).

Other projects that are given financial support are: a project called *Bottom dynamic model for phosphorus in Baltic Sea archipelagoes*, The HELCOM project *Development of HELCOM*

Data and Geographic Information System for supporting the implementation of the Baltic Sea Action Plan and the HELCOM project Development of HELCOM Geographic Information System for supporting the implementation of the HELCOM Baltic Sea Action Plan.

The Environmental Action plan 2009-2012

A relevant key document is the Environmental Action Plan - now for the period 2009-2012. It sets the strategic directions for the co-operation in the Nordic Council of Ministers regarding environmental issues. The plan focuses on four themes. Eutrophication fall within the theme "Sea and coastal regions". The overall goal of the theme is to achieve good ecological status by the year 2020 in the Nordic Waters and that they are used in a sustainable way. The objective for the work with eutrophication is that "Over-fertilization must be reduced so ecosystems can be maintained and a fine ecological status can be achieved" (Environmental Action Plan 2009-2012 p.17). The plan states that eutrophication is a threat both to the environment but also to economic development in the region. The plan also highlights the importance of EU's Marine Strategy Framework Directive (MSFD), the Water Framework Directive (WFD) as well as HELCOM's Baltic Sea Action Plan (BSAP). Great efforts are, according to the plan, needed to reduce the emissions of nutrients from different sources. The plan has following priorities: that the countries will work together in a cooperative manner regarding the actions plans described in the WFD, MSFD and the BSAP, that knowledge of correlations between nutrients and the status of the Sea has to increase as well as the knowledge of correlation between eutrophication and climate change. Other prioritized topics are to develop different strategies in forms of various policy instruments, better technology and other ways to reduce emissions that cause over-fertilization and to work for that the effects on the marine environment are taken into account in EU agricultural policy and the included environmental support programmes (Environmental Action plan, 2009-2012). Projects can apply for financial support by the Nordic Council of Ministers' Environment working groups if certain criteria are met, such as that at least three Nordic countries are involved and that the project go in line with the objectives set in the Environmental Action Plan 2009-2012 (Norden, 2010g).

References

- Environmental Action Plan 2009-2012, Nordic Council of Ministers, Copenhagen, 2008.** http://www.norden.org/sv/publikationer/publikationer/2008-736/at_download/publicationfile
- EUTRO2010 (2010).** <http://www.eutro2010.dhi.dk/links.html> 2010-06-14
- Norden (2010a).** http://www.norden.org/en/about-nordic-co-operation/nordic-co-operation?set_language=en 2010-06-14
- Norden (2010b).** http://www.norden.org/en/nordic-council/the-nordic-council/about-the-nordic-council?set_language=en 2010-06-15
- Norden (2010c).** <http://www.norden.org/en/nordic-council/organisation-and-structure/committees/about-the-nordic-council-committees> 2010-06-15
- Norden (2010d).** <http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/council-of-ministers-for-the-environment-mr-m/the-nordic-council-of-ministers-for-the-environment-mr-m> 2010-06-14
- Norden (2010e).** <http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/council-of-ministers-for-the-environment-mr-m/institutes-co-operative-bodies-and-working-groups/working-groups/working-group-for-aquatic-ecosystem-aeg/om-akvatiska-ekosystemgruppen> 2010-06-14
- Norden (2010f).** <http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/council-of-ministers-for-the-environment-mr-m/institutes-co-operative-bodies-and-working-groups/working-groups/working-group-for-aquatic-ecosystem-aeg/funding-from>

[the-working-group-for-aquatic-ecosystem/apply-for-funding/akvatiska-ekosystemgruppens-prioriteringar-foer-2011](#) 2010-06-15

Norden (2010g). http://www.norden.org/sv/nordiska-ministerraadet/ministerraad/ministerraadet-foer-miljoe-mr-m/stoed-fraan-nordiska-ministerraadets-miljoesamarbete/om-stoedordningen?set_language=sv 2010-06-15

Nordic Council of Ministers' project database <http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/council-of-ministers-for-the-environment-mr-m/institutes-co-operative-bodies-and-working-groups/working-groups/working-group-for-aquatic-ecosystem-aeg/projektoversigt> 2010-06-14

European Union level

Eutrophication is recognized as a problem within the European Union (EU) and it is identified as a priority issue for water management (Anon. 2009a). Despite this, it is difficult to pinpoint specific structures within the EU that has eutrophication on their agenda. When looking for bodies working with eutrophication, what you will find is bodies working with environmental (water related) issues. As eutrophication can be linked to agriculture, fisheries, shipping and industry (e.g. large poultry and pig farms), apart from typical environmental (normally water) issues, all these areas would need to be looked into if a complete and correct picture of the bodies working with eutrophication in the EU is the aim.

In the Fig. 1 an attempt is made to give the structure of the different bodies dealing with environmental, and consequently also eutrophication to some extent, issues in the EU. In the following text the different parts of the figure will briefly be explained. As these bodies are dealing with several environmental issues and not specifically eutrophication, a closer look will be taken at the policy areas and the directives that directly or indirectly deal with eutrophication (the green box in the figure). According to the EU itself, it is via the directives that eutrophication is dealt with in the EU.

Important to note about the EU is that the new Lisbon treaty might have some effects on the structure and function of the different EU bodies.

6th Environment Action Programme

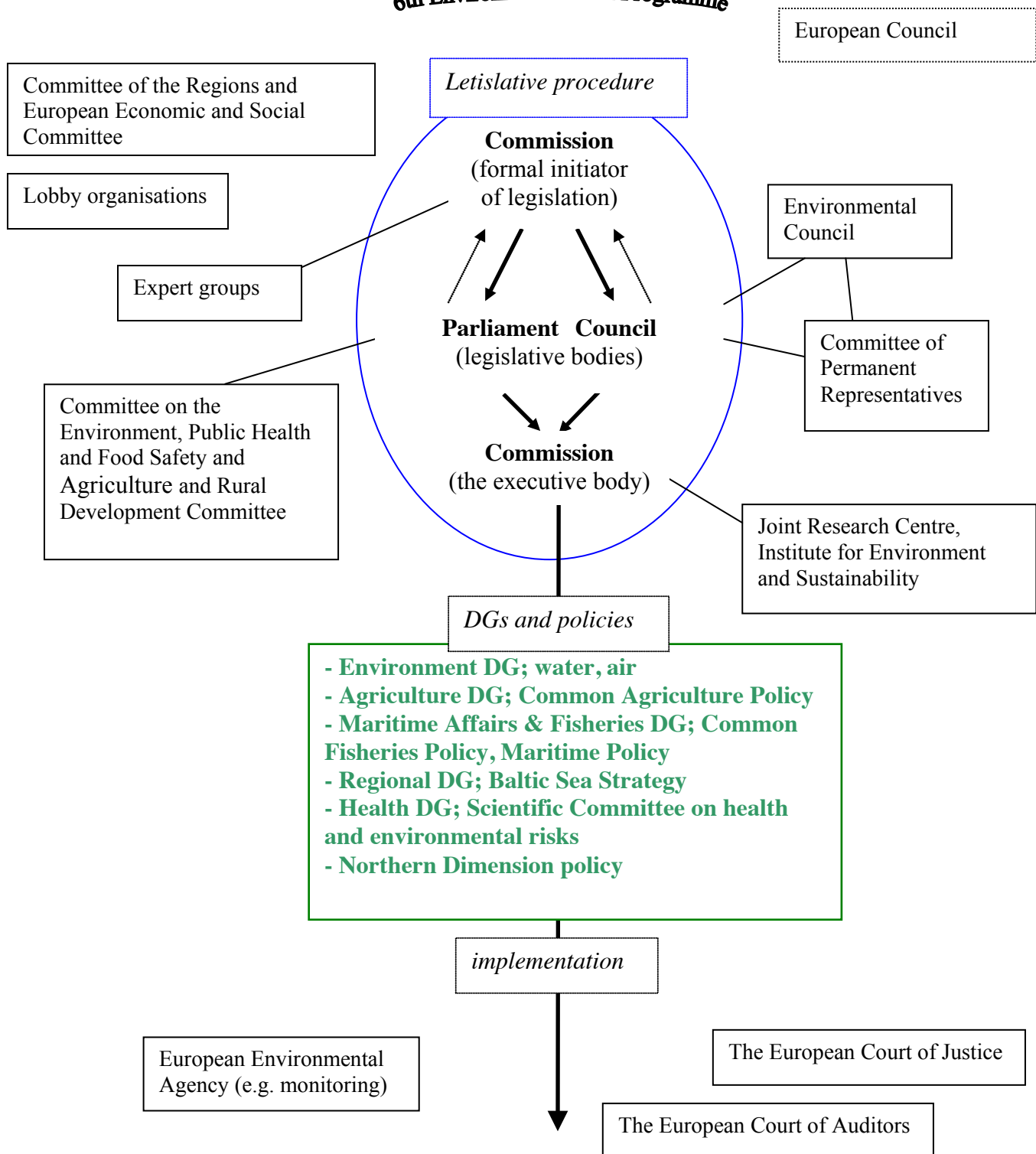


Fig.1. The central institutions and bodies of European environmental governance with the DGs and policies concerning eutrophication highlighted in green.

Sixth Environment Action Programme

The Sixth Environment Action Programme (6th EAP) was adopted in 2002 and sets out the framework for the environmental policy of the EU for the period 2002-2012. The four priority areas are climate change, nature and biodiversity, environment and health, and natural resources and waste. Within the 6th EAP seven thematic strategies have been developed covering air, waste prevention and recycling, marine environment, soil, pesticides, natural resources and urban environment. These strategies are supposed to modernize EU environmental policy making, focusing measurements on an integrated approach and an effective implementation. Within the marine environment thematic strategy, the Marine Strategy Directive has been developed.

<http://ec.europa.eu/environment/newprg/index.htm>

European Commission

The formal initiator of legislation within the EU is the European Commission. It also functions as the executive body of the Union, which means that it manages the implementation of EU policies and supervises the European treaties and laws in the member states. The Commission is therefore both a political and administrative body. Within the Commission there are 19 different departments, or Directorate-Generals (DGs), that are related to EU policies. Each of these covers a specific policy area and is headed by a commissioner. The two DGs and the related policies that are of greatest interest to this case study are:

- Environment DG; Community Water Policy
- the DG for Agriculture and Rural Development; Common Agricultural Policy

Apart from the above mentioned DGs and policies also following DGs and policies are of some interest to this study:

- DG for Maritime Affairs and Fisheries; Common Fisheries Policy and Maritime Policy
- DG for Regional Policy; Regional Policy, with focus on the EU Strategy for the Baltic Sea Region
- DG for Health and Consumer Protection; with focus on the Scientific Committee on Health and Environmental Risks
- Northern Dimension policy

http://ec.europa.eu/index_en.htm

Directives – bottom up

Directives are the most often used form of legislation for environmental policy in the EU. Directives set stringent objectives that have to be reached in each member state, but the governments can themselves choose the means of reaching the targets (Brady 2005, p. 62).

In order for a national government to properly implement an EU directive, the government has to ensure that there is an appropriate law to transfer the directive. The government also has to put the infrastructure into place to introduce the measures and procedures needed for practical compliance with the EU derived legislation. When the law and the infrastructure are arranged the government also has to control the procedures and set up monitoring. The EU

body that both proposes new legislative pieces, as well as follows up the implementation of these in the member states is the Commission. (Brady 2005, p. 67).

According to the EU (Anon. 2009a, p. 19) the directives of greatest importance for the mitigation of eutrophication are the Urban Wastewater Treatment Directive (91/271/EEC), the Nitrates Directive (91/676/EEC), the Water Framework Directive (2000/60/EC) and the Marine Strategy Framework Directive (2008/56/EC), all being a part of the Community Water Policy. The same directives are also mentioned by the Helsinki Commission (HELCOM) (Anon. 2009b, p.92).

The Environment DG and the Community Water Policy

Several DGs are to some extent involved in environmental matters, but it is the Environment DG, sometimes called the DG ENVI, that is ultimately responsible for the drafting of environmental legislation and the implementation of environmental policy (Weale et al 2005, p 89). The objectives for this DG are “to protect, preserve and improve the environment for present and future generations”. It is also the Environment DG which supervises the implementation of EU environmental law into Member States.

One of the policies which are handled by the Environment DG is the Community Water Policy, the policy area of greatest importance to this study. Within this policy all the most relevant directives are to be found. The directives that address the main anthropogenic sources of nutrients are the Nitrates Directive (91/271/EEC) and the Urban Waste Water Treatment Directive (91/271/EEC). Another directive that ought to be of some importance, even though it is rarely mentioned as a directive dealing with eutrophication, is the Integrated Pollution Prevention and Control Directive (96/61/EC). In 2000 the Water Framework Directive (2000/60/EC) came into force, becoming THE water directive of Europe, and in 2008 the Marine Strategy Framework Directive (2008/56/EC) was adopted.

Apart from the above mentioned directives also other directives, usually focused on a specific matter, to some extent regulate water nutrient levels, but these are not considered of main importance (Anon. 2009a, p. 19-22); Freshwater Fish Directive (2006/44/EC), Shellfish Water Directive (2006/113/EC), Dangerous Substance Directive (67/548/EeC), Groundwater Directive (80/68/EEC), Bathing Water Directive (2006/7/EC), Habitats Directive (92/43/EEC).

The Environment DG is headed by the Commissioner for the Environment Janez Potocnik. The organization is divided into an Office of the DG and 6 Directorates from A to F, plus a Shared resources directorate. Directorate D is dealing with water, chemicals and biotechnology, and is further divided into 3 units, of which D1 (Water) and D2 (Marine) might be of interest to this study. Peter Gammeltoft and Nicola Notaro are working on D1, while Claude Rouam and Helmut Bloech are working on D2.

http://ec.europa.eu/dgs/environment/index_en.htm

http://ec.europa.eu/environment/water/index_en.htm

The most important directives in brief:

Nitrates Directive

The Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources was adopted in 1991. This directive is usually referred to as the Nitrates Directive and the aim is to protect both ground and surface water quality from nitrate pollution caused by agriculture. The directive also aims at promoting the use of good farming practices and is considered one of the key instruments in the protection of waters against agricultural pressures.

In short, the steps of implementation of the directive in the member states were:

- To identify polluted or threatened waters
- To design “vulnerable zones” (areas of land draining into polluted or threatened waters)
- To develop action programmes for the “vulnerable zones” (a set of measures to prevent and reduce nitrate pollution, which in short means that no more than 170 kg animal manure/ha should be spread on these zones)
- To establish codes of good agricultural practice, e.g. time limits when fertilizers can be applied on land (these should be implemented by farmers on a voluntary basis)
- To develop national monitoring programmes with regard to nitrate concentration (both in surface and ground water) and trophic status, and to report to the Commission every four years.

The member states were given 2 years (till 1993) to coordinate their legislation in accordance with the directive. 2 years later, in 1995, the restrictions should be in place. By 2003 the countries concerned ought to meet the standard of manure spread on the vulnerable zones, and the directive should be completely implemented.

http://ec.europa.eu/environment/water/water-nitrates/index_en.html

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0676:EN:NOT>

Urban Waste Water Treatment Directive

The Council Directive 91/271/EEC concerning urban waste water treatment is normally referred to as the Urban Waste Water Treatment Directive, or the UWWTD. It concerns “...the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors.” In 1998 the Directive was amended through the Commission Directive 98/15/EC that also took into consideration discharges from waste water treatment plants to sensitive areas threatened by eutrophication.

The aim of the UWWTD is to protect the public health, water resources and wildlife from the harms caused by waste water discharges. The directive states that waste water, before discharged to the environment, has to be collected and subjected to secondary (biological) treatment according to following time plan:

- Discharges from agglomerations of more than 15000 inhabitants, in 2000, at the latest
- Discharges from agglomeration of between 10000 and 15000 inhabitants, in 2005, at the latest

- Discharges from agglomeration of between 2000 and 10000 inhabitants, in 2005, at the latest

According to the Decision 93/43/EEC discharges from agglomeration of more than 10000 to sensitive areas need even better treatment methods than secondary treatment. The requirements have also to be fulfilled already by 1998.

http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0271:EN:NOT>

Integrated Pollution Prevention and Control Directive

The purpose of the *Council Directive 96/61/EC concerning integrated pollution prevention and control* or the IPPC directive, is to prevent or control pollution from industrial activities in order to reduce emission to air, water and land. The directive was codified in 2008 (Directive 2008/1/EC). In 2007 a proposal for a new directive on industrial emissions was presented by the Commission. This new Directive would include seven existing directives, among others the IPPC directive.

The directive requires industries to obtain an environmental permit from the authorities and to apply Best Available Techniques (BATs). At the moment ca 52 000 industries (e.g. factories, energy-generating plants, large farms) are covered by the IPPC directive. The deadline for new industrial installations to meet the requirements of the directive was in 1999, while the final deadline for all, both new and already existing industries was in 2007.

The IPPC directive is, as mentioned above, the directive that probably has the smallest impact on eutrophication, and that usually is not even mentioned in an eutrophication context. However, installations for the intensive rearing of poultry or pigs are mentioned as an industrial category in Annex I of the directive, while “substances which contribute to eutrophication (in particular, nitrates and phosphates)” are mentioned in Annex III.

<http://ec.europa.eu/environment/air/pollutants/stationary/ippc/index.htm>

<http://ec.europa.eu/environment/air/pollutants/stationary/ippc/summary.htm>

Water Framework Directive

In mid 1990s the directives regulating the water resources of the EU were numerous and the whole water policy fragmented. The Community water policy was not designed for sustainability but for pollution control in certain waters or by certain pollutants (Lindholm 2002). In 2000 the water policy was renewed through the *Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy*, or the EU Water Framework Directive (WFD). The new directive replaced several of the former water directives while other pieces of legislation would become complementary to it. The WFD covers all uses and types of water and the ultimate aim is to prevent further deterioration and to achieve a “good status” of all European waters.

The purpose of the Directive is to “...establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater...” This means that:

- The aquatic environment will be protected and future deterioration prevented

- Sustainable water use will be promoted, and will be based on long-term protection of available water resources
- Protection of the aquatic environment will be enhanced and improved through reduction of discharges and emissions
- The pollution of groundwater should stop
- The effects of floods and droughts has to be reduced and controlled

The waters of Europe will in the future be managed through River basin management. This means that the water courses affected by the Directive will be divided into separate water units, or river basins, according to the natural geographical and hydrological conditions. Some EU countries already apply a River basin management approach, but for some this will be a new way of looking at the water resources. The Directive requires the member states to develop a river basin management plan for every river basin, and update the plan every six years.

The WFD entered into force in 2000 and with it follows a long list of implementation deadlines that the member states have to meet. E.g. in 2003 the transposition into national law should have been completed, as well as the identification of river basin districts and authorities. This year, 2010, a pricing policy should be introduced, and in 2015 the aims set by the Directive should have been reached. If the Directive is a success all waters in Europe, both surface and ground should, will by then be of good quality.

http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>

Marine Strategy Framework Directive

The Directive 2008/56/EC of the European Parliament and of the Council establishing a framework for community action in the field of marine environmental policy, in short the Marine Strategy Framework Directive or the MSFD, was adopted in 2008 with the objective to more effectively protect the marine environment. Good environmental status of the EU's marine waters shall be achieved as well as recourses that marine-related economic and social activities depend upon shall be protected by 2020 it states. The MSFD is the key to the future EU maritime policy. It is also a complement to the WFD, with similar goals, but dealing with the offshore waters.

According to the directive, European Marine Regions shall be established on the basis of geographical and environmental criteria. The Baltic Sea is considered one of the regions in the Union, the others being the North-east Atlantic Ocean, the Mediterranean Sea, and the Black Sea. Countries bordering the Marine Region, both Union members and non-members, are required to develop strategies for the common sea area, and to coordinate the strategy between themselves. The strategy has to contain "... a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes." By 2012 the member states shall provide the Commission with a comprehensive assessment of the state of the marine region, identifying the main pressures on the region as well as defining targets and monitoring indicators. By 2015 coherent and coordinated programmes for measures intended to be taken has to be presented.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0056:EN:NOT>

The DG for Agriculture and Rural Development and the CAP

The Directorate-General (DG) for Agriculture and Rural Development has the mission to *“promote the sustainable development of Europe's agriculture and to ensure the well-being of its rural areas”*. Commissioner Dacian Ciolos has the political responsibility for the DG and in charge of the office in Brussels is the Director-General since 2006, Jean-Luc Demarty. The main task for the DG and their around 1000 employees is to deal with implementation and different aspects of the Common Agricultural Policy (CAP) and the rural development policy. This work is divided in 13 Directorates, A to M, and contains conjunction with other DGs, especially in issues regarding rural development, which is dealt with in Directorates E to H and under Deputy Director-General Loretta Dormal-Maino. Direction H, led by Maria Angeles Benitez Salas, has the main responsibility of environment and sustainability in agriculture and rural development.

The rural development policy 2007-2013 is set through the Council Regulation 1968/2005, the European Agricultural Fund for Rural Development (EAFRD) and this is based on three axis, or themes, which are:

- To improve the competitiveness in agriculture and forestry by restructuring and development
- To improve environment and countryside by land management
- To improve life quality in rural areas by support diversification of occupations

Support for environment measures are not specified but can only be paid for voluntary measures that go beyond ordinary regulations. Member states set their own National Strategy Plans but these must fulfill EU Strategic Guidelines, Council Decision 2006/144/EC. In the Strategic Guidelines eutrophication and nutrient loads from agriculture are mentioned as environmental issues that in some areas have been reduced since 1990, but still are a problem in many areas. Support to organic farming is one of the key actions that are recommended.

http://ec.europa.eu/dgs/agriculture/index_en.htm.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005R1698:EN:NOT>

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006D0144:EN:NOT>

CAP

The origin of EU's Common Agricultural Policy (CAP) is the damaged Western Europe in the 1950s that had suffered of several years of war. Since food supply could not be guaranteed, financial aids was provided to farmers for investments that increased production and therefore ensured a viable agricultural sector. Subsidies were also connected to a produced quantity and this system led to a surplus of many farm goods. In the 1980s and 1990s reforms of the policy were made in order to reduce these surpluses and the policy had become unpopular in public since it cost a lot of money and led to disturbed prices in the World market. Quotas for production were now used and the surpluses of farm goods gradually sank.

In 2003 a fundamental reformed CAP was adopted which decoupled subsidies with production. To ensure development of a sustainable agriculture the reformed CAP contains links with other standards such as animal welfare, food safety and environmental conditions in agriculture, so called cross-compliance. The Nitrate Directive is one of these regulations that must be fulfilled and also the establishment of buffer strips along water courses. If

farmers fail to meet these standards, payments from CAP will be reduced. In this way CAP refers to the Polluter-Pays-Principle (PPP). Farmers have also the possibility to get paid for Agri-environmental measures made voluntary. Different measures are designated from national to local level, depending on farming system and environmental condition. There is also a modulation in payments where big farms will have less direct payments in favor for the new rural development policy.

http://ec.europa.eu/agriculture/envir/index_en.htm

http://ec.europa.eu/agriculture/envir/measures/index_en.htm

http://ec.europa.eu/agriculture/envir/nitrates/index_en.htm

http://ec.europa.eu/agriculture/envir/water/index_en.htm

The DG for Maritime Affairs and Fisheries

The Directorate-General for Maritime Affairs and Fisheries (DG MARE) has a staff of about 400 and is led by General-Director Lowri Evans. Political responsibility has Commissioner Maria Damanaki. DG MARE is responsible for two policy areas: the EU Integrated Maritime Policy (IMP) and Common Fisheries Policy (CFP). The work is divided in six Directorates where Directorate A has the main responsibility for policy development and cooperation and Directorate E is dealing with the Baltic Sea, the North Sea and landlocked Member States.

The first instrument for establishment of a European policy about fishery was taken early in the 1970s and the Common Fisheries Policy was created 1982. In 2007, IMP was launched with a mission to: “... realise the economic potential of the oceans and seas in harmony with the marine environment (...)”. This will be done by coordination of activities and policies in different areas with maritime dimension to avoid inconstancies, by building knowledge bases and cross-cutting tools, by promoting cooperation and integration of governance structures and by tailor-made solutions for regional seas. DG MARE has the overall responsibility to develop cross-cutting tools and the co-ordination of IMP. In many of the provided actions within IMP, there are objectives to maintain best practice.

Achieved actions within the IMP which can relate to eutrophication are:

- Roadmap on Maritime Spatial Planning: Achieving Common Principles in the EU http://ec.europa.eu/maritimeaffairs/spatial_planning_en.html
- Integrated Coastal Zone Management (ICZM) <http://ec.europa.eu/environment/iczm/home.htm>
- The European Marine Observation and Data Network (EMODNET)
- The Marine and Maritime Research Strategy
- The European Atlas of Sea projects

In the Baltic area, EU Strategy for the Baltic Sea Region is a first step to implement IMP and sea-basins strategies considered to be important for successful implementations in other areas also.

http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm

http://ec.europa.eu/dgs/maritimeaffairs_fisheries/about_us/mission_statement/index_en.htm

http://ec.europa.eu/maritimeaffairs/pdf/ActionPaper/action_plan_en.pdf

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:DKEY=502415:EN:NOT>

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0575:FIN:EN:PDF>

The DG for Regional Policy and the EU Strategy for the Baltic Sea Region

The Directorate General for Regional Policy, or DG REGIO, was founded 1968 after the first Communication about a European Regional Policy had been adopted by the European Commission in 1965. In 1986, the Single European Act introduced legal foundation for an integrated cohesion policy. The political responsibility has Commissioner Johannes Hahn. DG REGIO had 2009 a staff of 741 and the work is led by Director General Dirk Ahner and two Deputy Director Generals and is divided in 10 Directorates, A to J. Directorate B – D deals with development, coordination and communication of the Cohesion Policy and Directorate E – I deals with convergence, competitiveness and cross-border programmes in different countries (DG REGIO, 2010 a & b).

DG REGIO's mission is to transfer resources from wealthy parts of the Union to poorer areas through reducing disparities in development and support actions that lead to a stronger cohesion in so well economic, social as territorial meaning. For this DG REGIO has management over several funds and financial instruments, where two major funds are:

- The European Regional Development Fund (ERDF)
- The Cohesion Fund (CF)

According to the European Commission is 19 percent of regional funding used to environment. ERDF has Wastewater projects as one result indicator and for CF one objective is to contribute financially in interventions that benefit the environment. Also in this fund, Wastewater project is used as an indicator (DG REGIO, 2010c).

http://europa.eu/pol/reg/index_en.htm

http://ec.europa.eu/regional_policy/policy/history/index_en.htm

There are different programmes set for different parts of EU, in national level as well as transnational regions, that includes cross-border cooperation and parts of the Cohesion Policy. In the Baltic Sea Regional Programme 2007-2013 all EU countries bordering the Baltic Sea participates and it also includes the Russian Federation, Belarus and Norway. One of the programme's priorities is to manage the Baltic Sea as a common resource and supports operation that will limit environmental pollution. WATERPRAXIS is a project within this programme that focus on practical implementation of River Basin Management Plans (RBMPs). It is a project that combines the Water Framework Directive, EU Strategy for the Baltic Sea Region and Regional Policy. Lead partner is Finnish Environment Institute.

http://ec.europa.eu/regional_policy/cooperation/baltic/pdf/first24_project.pdf

<http://www.waterpraxis.net/>

Central Baltic Interreg IV A is an example of an Operational Programme. This programme supports cooperation and projects in regions of Finland, Estonia, Latvia and Sweden. Safe and Healthy Environment is one priority axe in the programme that will focus on protection and improving the condition of the Baltic Sea. Examples of projects in this programme that deals with eutrophication is Active Wetlands, which supports establishment of wetlands in Finland and Estonia http://www.wwf.fi/ymparisto/meret_sisavedet/kosteikot/lisamateriaali/active_wetlands.html, and MINWA – Minimization of Wastewater Loads at Sparsely Populated Areas - focusing on research, experience and best practice that leads to development in Finland and Estonia (<http://www.centralbaltic.eu/component/content/article/6-project-info/294-minwa-minimization-of-wastewater-loads-at-sparsely-populated-areas>).

EU Strategy for the Baltic Sea Region

The Strategy aims to harmonize actions and policies from different areas and stakeholders by creating a new sort of 'macro-region'. It has four cornerstones where "to make the Baltic Sea Region an environmentally sustainable place" is one. This cornerstone is divided in five priority areas where "To reduce nutrient inputs to the sea to acceptable level" and "To become a model region for clean shipping" are significant for eutrophication (Action Plan, SEC (2009) 712/2, s 8).

EU Strategy for the Baltic Sea Region was endorsed by the European Council in October 2009 since the European Commission had adopted a Communication about it in June 2009. This Communication expects of that many of EU's policies and programmes will play key elements in the strategy, such as the Cohesion Policy and the Common Agricultural Policy (CAP) and also that HELCOMs BSAP and the Marine Strategy Framework Directive shall be used as guides regarding interventions regarding environmental concern (COM (2009) 248 final, s 5).

The Action Plan states that HELCOM and their Baltic Sea Action Plan (BSAP) have a key role for the implementation of the Strategy and the environment objectives. For an effective development of the Strategy and other EU policies, it is needed that member states of HELCOM are involved in BSAP. The development of national implementation plans struggles with internally divergent views from national ministries. Positive conditions in the area that should make the implementation easier are that the Baltic Sea has been designated as a Particular Sensitive Sea Area (PSSA) and a Sox Emission Control Area (SECA) by the International Maritime Organisation (IMO). Russia's involvement in the framework of the Northern Dimension Environmental Partnership is also a positive condition.

As strategic action to achieve the reduced nutrient input, the Action Plan states that actions and commitments in BSAP must be implemented and fulfilled. The Nitrate Directive and buffer strips along water courses according to the Common Agricultural Policy must be implemented no later than 1st January 2012. Further is it important to, in the whole catchment area, identify all intensively used agricultural land and there maximize fertilizer efficiency by Rural Development measures. A full implementation of the Water Framework Directive by the year 2015 and implementation of the Urban Waste Water Directive will follow the objectives in the Marine Strategy Framework Directive for 2020.

Cooperative actions in the Action Plan are: establishment of more wetlands, the set up of a Bonus 169 scheme for a stronger collaboration in research and facilitation of dialogue in policy level between sectors such as agriculture, environment and rural development.

Examples of flagship projects in the Action Plan are:

- "*Cleaner waste water*" identifying and upgrading of Waste Water Treatment Plants according to HELCOMs requirements and timetable. Lead: Sweden.
- "*Analyse results of pilot actions*" funded by the Baltic Sea Region Programme, LIFE and Baltic 21.
- "*Putting best practices in agriculture into work*" increase and promote knowledge to farmers of a nutrient-balanced agriculture. Lead: Farmers federations in Sweden, Denmark, Finland and Germany.

The Action Plans strategic action regarding clean shipping is to establish the Baltic Sea as NOx Emission Control Area within IMO. Cooperative actions are to encourage maritime stakeholders to adopt voluntary measures to reduce air emissions and waste water discharges. For examples through introduction of labels and awards in line with the Baltic Sea Challenge and Clean Baltic Shipping initiatives.

Examples of flagship projects in the Action Plan:

- *“Promote measures to collect ship generated waste”* enhance the ‘no special- fee’ system for port reception of waste, especially waste water from passenger ships and ferries. Lead: HELCOM.
- *“Eliminate the discharge of sewage from ships”* by making the Baltic Sea a designated control area for sewage discharges from passenger ships within IMO. Lead: HELCOM
- *“Conduct a feasibility study on LNG infrastructure for short sea shipping”* to form further action in replace oil by liquefied natural gas (LNG) that will reduce emissions. Lead: Danish Maritime Authority and the Nordic Council of Ministers.

SEC (2009) 712/2.

The Health and Consumers DG and the Scientific Committee on Health and Environmental Risks

The Scientific Committee on Health and Environmental Risks (SCHER) is one of three independent Scientific Committees managed by the Health and Consumers DG. The Committee provides the Commission with the scientific advice on risks related to pollutants in the environment and on changing physical conditions that might have a negative impact on health and the environment. The Committee has e.g. been requested to give its opinion on eutrophication and the risk associated to the use of phosphates in detergents (de Madariaga et al. 2007).

http://ec.europa.eu/health/scientific_committees/environmental_risks/index_en.htm

The Northern Dimension and the Northern Dimension Environmental Partnership

The Northern Dimension (ND) policy was initiated in 1999 to promote dialogue and concrete cooperation between the EU member states, Russia, Norway and Iceland. The focus of the policy is on northwest Russia, Kaliningrad, the Baltic, the Barents Seas as well as the Arctic and Sub-Arctic areas. The ND is dealing with several key priority areas, of which one is the environment. To handle questions concerning the environment the Northern Dimension Environmental Partnership (NDEP) has been established. Projects that are initiated within the NDEP are divided into environmental projects and nuclear safety projects. The environmental projects are to a great part focused on water and wastewater treatment as well as management of municipal and agricultural waste.

http://ec.europa.eu/external_relations/north_dim/index_en.htm

<http://www.ndep.org/>

Bodies assisting the Commission

There are several EU bodies working in close collaboration with the Commission:

Expert groups

There are several advisory bodies, or expert groups, set up by the Commission to assist it in preparing legislative proposals and policy initiatives. These bodies are either permanent or temporary, and can be of great importance as the Commission relies upon their advice when making decisions. However, the information on these is scarce on the internet. The groups are listed on the Commission homepage (<http://ec.europa.eu/transparency/regexpert/index.cfm>) and some of them might be of interest to this study. Below two examples:

- Environment Policy Review Group
 - o Register code E00366, permanent group
 - o Set up in 1993, under the Fifth Environmental Action Programme
 - o A meeting of 52 top environmental civil servants from the Member States' environment ministries
 - o holds four meetings every year, allowing for a regular exchange of ideas between the European institutions and national officials
 - o a discussion forum for long term policy issues (not a management body)
- Expert Group on Water Framework Directive and Agriculture
 - o Register code E01596, permanent group
 - o Set up in 2006
 - o Mission: exchange of experience on WFD and agriculture, identification of options to further integrate the WFD in the agricultural policy
 - o 48 members representing science, authorities, NGOs, industry, unions etc.

It is not possible from the register to say which of the expert groups are dealing with eutrophication. For this knowledge we need inside information.

Joint Research Centre and the Institute for Environment and Sustainability

The Joint Research Centre (JRC) provides the Commission with scientific advice and technical know-how upon its work with EU policies. The JRC consists of seven scientific institutes of which the Institute for Environment and Sustainability (IES) is of the greatest importance to this study. The mission of the IES is to provide scientific and technical support to EU policies for the protection of the environment contributing to a sustainable development in Europe. The institute directly supports several DGs and works closely with the European Environment Agency. The research activities of the IES are distributed between several scientific Units and the tasks divided into 23 research actions. The most interesting Unit for this study is probably the Rural, Water and Ecosystem Resource Unit, but also the Global Environment Monitoring Unit and the Transport and Air Quality Unit might be of interest. Of the actions the Protection and Conservation of European Seas (action 21203) and the Integration of environment concerns into agriculture (action 21107) seems relevant to this study. Apart from these a project called Facing the excess of nutrients endangering our coastal and marine ecosystems that supports WFD, Nitrates Directive and UWWTD has been financed by the IES.

<http://ec.europa.eu/dgs/jrc/index.cfm?id=10>

<http://ies.jrc.ec.europa.eu/marine-eutrophication>

European Parliament

The European Parliament (EP) consists of 736 members (or MEPs) elected by EU citizens. It shares the legislative power and control over the EU budget together with the Council of the European Union. The EP has 20 Standing Committees that consists of 28-86 MEPs. In the Standing Committees legislative proposals are dealt with before they are presented to the plenary.

http://www.europarl.europa.eu/news/public/default_en.htm

Committee on the Environment, Public Health and Food Safety

The Committee on the Environment, Public Health and Food Safety (ENVI) was set up in 1973 and has 68 members. The committee is served by a secretariat of 10 administrators. The committee was during the ca 30 first years considered of little importance, but since the 1990s its power has increased, partly due to the rising importance of environmental issues, and is now considered one of the most important ones. The committee is responsible for following environmental policy and environmental protection measures:

- air, soil and water pollution, waste management and recycling, dangerous substances and preparations, noise levels, climate change, protection of biodiversity,
- sustainable development,
- international and regional measures and agreements aimed at protecting the environment,
- restoration of environmental damage,
- civil protection,
- the European Environment Agency;

<http://www.europarl.europa.eu/activities/committees/homeCom.do?language=EN&body=ENVI>

http://www.europarl.europa.eu/comparl/envi/default_en.htm (old page, but with more information)

Agriculture and Rural Development Committee

The Agriculture and Rural Development Committee is responsible for among other things the operation and development of the common agricultural policy, as well as the rural development

<http://www.europarl.europa.eu/activities/committees/homeCom.do?language=EN&body=AGRI>

It is difficult to find information on this committee

The Council of the European Union

The Council of the European Union, also referred to as the Council of Ministers or only the Council, is the supreme decision making body of the EU. Within the Council the ministers of the EU member states meet. The issue on the agenda determines which ministers will come together. If e.g. environmental issues are to be discussed the Environment Ministers from each EU country will meet up and the meeting will be known as the “*Environment Council*”.

A special feature of the Council is that the presidency is rotated between the member states every six months.

The Council is responsible for:

- the passing of laws, usually legislating jointly with the European Parliament.
- co-ordination of broad economic policies of the Member States.
- Definition and implementation of the EU's common foreign and security policy, based on guidelines set by the European Council.
- international agreements between the EU and one or more states or international organizations, on behalf of the Community and the Union,
- co-ordination of actions of Member States and adopting of measures in the area of police and judicial co-operation in criminal matters.
- The Council and the European Parliament constitute the budgetary authority that adopts the Community's budget.

The different political issues are discussed in nine different council configurations, of which the Agriculture and fisheries and the Environment configuration could be of importance for this study. The Agriculture and Fisheries configuration is one of the oldest, where once every month the ministers for agriculture and fisheries meet. The environment ministers meet ca four times a year in the Environment configuration.

The heads of states of the member as well as the president of the European Council and the president of the Commission states meet ca four times a year to define the general political direction of the Union. These meetings are known as the "*European Council*". The European Council has, contrary to the other "Councils", no legal power.

http://europa.eu/institutions/inst/index_en.htm

<http://www.consilium.europa.eu/showPage.aspx?id=&lang=en>

<http://www.european-council.europa.eu/home-page.aspx?lang=en>

Committee of Permanent Representatives

The Councils mentioned above are not standing bodies, and the organization that arranges and assists in these meetings is the Committee of Permanent Representatives or the COREPER. The COREPER is made up of national officials, holding ambassadorial or deputy ambassadorial positions. As the COREPER prepares the Council meetings for e.g. the environment ministers, it can also play an important role in the development of environmental policy. There are several COREPER special committees that handle the proposed legislative points before they are presented to the ministers in the Council meetings. Weale et al. 2005 (p. 99) points out that there are not yet any detailed account of COREPER's work with regard to environmental policy, even though their influence is considered extensive.

COREPER deals with all areas of the Council's work except for agricultural matters, which are handled by the Special Committee on Agriculture (SCA).

http://europa.eu/scadplus/glossary/coreper_en.htm

Other EU bodies

Court of Justice of the European Communities

The Court of Justice of the European Communities, often referred to as the Court of Justice, was set up in 1952 in Luxembourg. The court is composed of 27 judges, one from each member state, and it makes sure that EU legislation is interpreted and applied similarly in all EU member states, and it e.g. deals with disputes on implementation of different directives.

http://europa.eu/institutions/inst/justice/index_en.htm

European Court of Auditors

The Court of Auditors is based in Luxembourg and was set up in 1975. It consists of one member from each EU country. The role of the Court is to follow up EU funds and check that they are correctly used. The Commission, the Parliament and the Council as well as member states use the results of the Court's work to improve the financial management of the EU budget. Despite the name the Court has no judicial powers.

http://europa.eu/institutions/inst/auditors/index_en.htm

http://eca.europa.eu/portal/page/portal/eca_main_pages/home

European Environment Agency

There are a number of specialized and decentralized EU bodies, or Community agencies, that have been established to accomplish specific tasks. One of these is the European Environment Agency (EEA).

The purpose of the EEA is to provide independent information on the environment to those involved in the environmental policy, both the Community, member states as well as other organizations, e.g. NGOs. The agency coordinates the European environment information and observation network (Eionet), where national environmental data is assembled. EEA was established in 1990 and is located in Copenhagen, Denmark and has a staff number of 191. It is organized into eight different programmes with several working groups attached to each. Of importance to this study is the Natural Systems and Vulnerability programme and the Water working group, headed by Beate Werner (see <http://www.eea.europa.eu/about-us/who/staff-list?orgid=NSV2> for more details).

<http://www.eea.europa.eu/>

Committee of the Regions

The Committee of the Regions (CoR), established in 1994, is the political assembly of local and regional representatives within in the EU. The EU institutions must always consult the CoR when legislative proposals that affect areas on a regional or local level are suggested. There are 344 members from all 27 EU countries in the CoR, that is organized into 6 different commissions. The Commission for the Environment, Climate Change and Energy (ENVE Commission), chaired by Ilmar Reepalu (ledarmot i Malmö kommunfullmäktige) is probably of the most interest to this study.

<http://www.cor.europa.eu/pages/HomeTemplate.aspx>

European Economic and Social Committee

In the European Economic and Social Committee (EESC) European social and economic interest groups can express their views on EU issues – opinions that will be forwarded to the Commission, the Parliament and the Council. The organization was founded in 1957. The 344 members of the EESC are nominated by national governments and appointed by the Council for 4 years in office. There are three different groups within the EESC: Employers, Employees and Various Interests and six different sections or units, of which the Agriculture, Rural Development and the Environment Unit (NAT), headed by Jakob Andersen, might be of interest.

http://www.eesc.europa.eu/organisation/how/index_en.asp

Other organisations

European Environmental Bureau, EEB

- Founded in 1974, office in Brussels (information service, working groups)
- The largest federation of environmental citizens' organization in Europe with more than 140 member organisations from 31 countries
- Examples of members: The Finnish Society for Nature and Environment, Swedish Society for Nature Conservation, Friends of the Earth Germany, Institute for Sustainable Development (Poland)
- The most important umbrella group for environmental interests in Europe
- Tries to ensure that environmental matters are recognized and discussed within the European institutions, facilitates dialogue between NGOs and national governments.
- Produces position papers and represents its members in discussions with the Commission, the EP and the Council (consultative status).
- Due to small office can only deal with issues on a general level
- Eutrophication:
 - Water and air (e.g. air pollutions from ships, ICCP-directive)

<http://www.eeb.org/>

Institute for European Environmental Policy, IEEP

- Founded in Bonn, 1976
- ...”An independent not for profit institute dedicated to advancing an environmentally sustainable Europe through policy analysis, development and dissemination”
- An environmental research organisation
- Both pushes its own initiatives and programmes and undertakes work for external sponsors and clients (does research studies, provide advice to e.g. national governments, the Commission, Parliament ect.)
- Policy research and analysis in following areas: Agriculture and Rural Development, Fisheries and Marine Environment, Industry, Chemicals & Waste, Water Management

- Staff: 34, 2 offices in: London, Brussels. IEEP staff member Marianne Kettunen, at SYKE as a guest researcher
- Eutrophication:

<http://www.ieep.eu/>

References

- Anon. 2009a.** Common implementation strategy for the water framework directive (2000/60/EC). Guidance Document No. 23. URL: http://www.mma.es/secciones/acm/politica_agua/directiva_marco_aguas/pdf/guia_23.pdf
- Anon. 2009b.** Eutrophication in the Baltic Sea. Baltic Sea Environment Proceedings No. 115B. URL: http://www.helcom.fi/publications/bsep/en_GB/bseplist/
- Brady, J. (Ed.) 2005.** Environmental management in organizations: the IEMA handbook. Earthscan, London.
- DG REGIO (2010a).** Organisation chart 2010. Downloaded from http://ec.europa.eu/dgs/regional_policy/document/organigramme_en.pdf, 2010-08-06
- DG REGIO (2010b).** Annual Activity Report 2009. Downloaded from http://ec.europa.eu/dgs/regional_policy/document/aar2009_en.pdf, 2010-07-29
- DG REGIO (2010c).** Management plan 2010 final version. Downloaded from http://ec.europa.eu/dgs/regional_policy/document/amp2010_en.pdf, 2010-07-26
- COM (2009) 248 final.** Communication from the Commission concerning European Union Strategy for the Baltic Sea Region, Downloaded from http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/baltic/com_baltic_en.pdf, 2010-07-29.
- Lindholm, A. 2002.** Finland in EU Environmental Policy. The Finnish Environment 551. Ministry of the Environment. URL: <http://www.ymparisto.fi/download.asp?contentid=14545&lan=en>
- de Madariaga, B. M., Ramos, J. & Tarazona J. V. 2007.** Model implementation and qualification of the eutrophication risk associated to the use of phosphates in detergents (INIA/Green Planet – report April 2007). URL: http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc_id=3095&userservice_id=1&request.id=0
- SEC (2009) 712/2.** Commission Staff Working Document concerning the European Union Strategy for the Baltic Sea Region, Action Plan. Downloaded from http://ec.europa.eu/regional_policy/cooperation/baltic/index_en.htm, 2009-08-05.
- Weale, A., Pridham, G., Cini, M., Konstadakopulos, D., Porter, M. & Flynn, B. 2005.** Environmental Governance in Europe – An ever closer ecological Union? 2nd ed. Oxford University Press, Oxford.

International sub-state and city networks

Union of the Baltic Cities (UBC)

UBC is a network with over hundred member cities in the ten countries bordering the Baltic Sea (UBC, 2010a). The organization was founded in 1991 with the purpose “*to contribute to balanced democratic, social, economic and environmental development in the Baltic Sea Region*” (UBC, 2010b). A Presidium, an Executive Board and a Secretariat - located in Gdansk, Poland and consist of three employees - are considered the core of the organization. In the Executive Board sit representatives from one member city from each member country. Every two years the General Conference meets in one of the member cities. This is the highest decision making body of UBC. The organization has one President and three Vice Presidents

(UBC, 2010c). There are several Commissions working in different areas. It is within these commissions that much of the organization's work is done (UBC, 2010d). The Commission of Environment is relevant for this case-study. Organized meetings for the Commission are arranged twice a year where representatives from the member cities (but also from cooperation partners) discuss issues, ideas and new projects (UBC, 2010e).

The Environment and Sustainable Development Secretariat in Finland is handling the practical work of the Commission of Environment (UBC, 2010f). Current project relevant for this case study is the PURE-project - a cooperation between UBC Commission of Environment (that is lead partner), HELCOM, John Nurminen Foundation (investment coordinator) and nine cities and their Waste Water Treatment Plants. The strategy is to reduce the eutrophication trend by supporting selected Waste Water Treatment Plants with the technique of chemical phosphorous removal. The project will also map the market for good practices concerning sludge handling (UBC, 2010g).

UBC consider the EU strategy for the Baltic Sea Region to be a key instrument in the work to reach sustainable development in the region and highlights the importance that the strategy is concrete and focused. In the document *UBC Contribution to the EU Strategy for the Baltic Sea Region* it is written: "It must include adequate instruments to exercise pressure to those who are responsible for implementation" (UBC, 2008, p.2). Further, it is UBC's view that the ecosystem approach must be part of this strategy. The importance to reform the agricultural policy is also mentioned as the agricultural sector is the main cause of eutrophication but also as it is an important part of the society. Therefore UBC wants the policy instruments to take ecosystems in consideration when modifying the system. It is written that "The strategy should lay foundation to prioritising. Priority actions should be followed by an action plan" (UBC, 2008, p.3). UBC advocate regional work and believe that "UBC has experiences and instruments in incorporating cities from non-EU countries. Cities can offer experiences and models for trans-boarder collaboration and coordination. We see the existing framework of contacts as a helpful instrument for the external dimension of the strategy" (UBC; 2008, p.7).

References

UBC, 2008. CONTRIBUTION OF THE UNION OF THE BALTIC CITIES TO THE BALTIC SEA STRATEGY OF THE EUROPEAN UNION

UBC, 2010a. <http://www.ubc.net/> 2010-07-27

UBC, 2010b. <http://www.ubc-environment.net/index.php/main:history> 2010-07-27

UBC, 2010c. <http://www.ubc.net/organisation> 2010-07-27

UBC, 2010d. <http://www.ubc.net/commissions> 2010-07-27

UBC, 2010e. <http://www.ubc-environment.net/index.php/main:activities> 2010-07-27

UBC, 2010f. <http://www.ubc.net/commissions,27.html> 2010-07-27

UBC, 2010g. <http://www.ubc-environment.net/index.php/main:pure> 2010-07-27

The Council of Baltic Sea States (CBSS)

CBSS was founded 1992 in Copenhagen. Members are the states bordering the Baltic Sea as well as Island, Norway and the European Commission. A secretariat is located in Stockholm, Sweden (CBSS, 2010a). The organization serves as a political forum for intergovernmental cooperation in the region dealing with a wide range of issues such as for example economic, health, culture, education and environmental protection matters. The declaration adopted in

1992 states that the contrasting parties have a joint responsibility to clean up the Baltic Sea and that progress already had been made due to the Helsinki Commission (CBSS, 1992).

The Council consists of all the Ministers for Foreign Affairs from respective member states. A member from the European Commission is also present there. The function of the Council is to “*serve as a forum for guidance and overall coordination among the participating states* “. The presidency rotates each year among the different member states. A Committee of Senior Officials (CSO) is assisting in the work to coordinate activities –the responsibility of the Foreign Minister of the country holding the Presidency (CBSS, 2010b). Senior foreign affairs officials that function as representatives from the various member states as well as the European Commission are present in the CSO. On the Committee’s meetings issues concerning the cooperation are discussed and different projects can be decided on (CBSS, 2009a).

Currently Norway has the presidency. One of the three priority areas is maritime policy dealing with both economic development linked to shipping and other maritime activities, and the environmental aspects with the problems caused by the shipping industry by different types of emissions and wastes. *The CBSS Expert Group on Maritime Policy* has been appointed to be responsible for these types of issues (CBSS, 2010c). In the group’s Terms of Reference it is written: “*The potential for growth in the Baltic Sea region’s maritime economy can be better utilized and its marine ecosystems better protected when the coastal states cooperate in and strive to synchronize all sectors of maritime action*” (CBSS, 2009b, p.1). Further it is written that “*Through the improvement of knowledge transfer between business, science and education, innovation shall be promoted in the Baltic Sea region and new employment shall be created. Such a policy will contribute to sustainability..*” (CBSS, 2009b, p.1). An Integrated approach is advocated in the document. According to CBSS the same approach is held by HELCOM although the Helsinki Commission specifically focuses more on protection aspects (CBSS, 2009b). CBSS advocates an open dialog between different sectors and groups in the society. Baltic 21- integrated 2010 as the CBSS Expert Group on Sustainable Development- function as a platform for dialog (CBSS, 2010d). The group is also responsible for different projects (called Lighthouse projects). One of them is EHSA - Ecosystem Health and Sustainable Agriculture-working to develop “*educational package for higher education on sustainable agriculture, land use and rural development, and preservation of eco-system health*” (Baltic 21, 2010).

As environment is one of the priority areas for CBSS, meetings of the Ministers of Environment have been arranged over the years. In 2007 for example a meeting for representatives from Ministries of Agriculture was arranged by CBSS. It resulted in a joint statement with agreements to i.e. support the development of HELCOM’s BSAP, to increase the efforts nationally to reduce the nutrients discharges from different sources, to prevent further increase of nutrients that affect the Baltic Sea from unsustainable practices, to support the work by BONUS Research program and encourage work by the Baltic Sea Regional Project for sustainable farming practices (read the whole list of agreements in the document CBSS 2007). The CBSS member states that also were members in EU agreed on for example to implement the WFD, the Nitrate Directive, the UWWD, the IPPC and the European Marine Strategy Directive as steps to fight pollution and eutrophication in the Baltic Sea. The Baltic 21 Group was called upon, among other things, to work for sustainable development such as sustainable agriculture and rural development and to cooperate with HELCOM in the work to implement the BSAP. The Council of the Baltic Sea States was also requested to prioritize the Baltic Sea, to fight degradation and to support implementation of the BSAP (CBSS, 2007).

References

- Baltic 21, 2010.** http://www.baltic21.org/?lhp_ehsa 2010-07-26
- CBSS, 1992.** Ministerial Session – Copenhagen Declaration, Conference of Foreign Ministers of the Baltic Sea States, Copenhagen, March 5-6, 1992.
- CBSS, 2009a.** Council of the Baltic Sea States Terms of Reference, Adopted by the 1st CBSS Ministerial Session in Copenhagen in March 1992, revised by the Ministerial Session in Szczecin in June 2005, revised by the Council in April 2009.
- CBSS, 2009b.** CBSS Expert Group on Maritime Policy, Terms of Reference Adopted by the CBSS Committee of Senior Officials, Copenhagen 2 June 2009.
- CBSS, 2007.** Joint Statement by the High-Level Representatives from Ministries of Agriculture and Environment of CBSS Member States, Saltsjöbaden, Sweden 19-20 April 2007.
- CBSS, 2010a.** <http://www.cbss.org/CBSS-The-Council/history> 2010-07-26
- CBSS, 2010b.** <http://www.cbss.org/CBSS-The-Council/the-council> 2010-07-26
- CBSS, 2010c.** <http://www.cbss.org/CBSS-The-Council/council-presidency> 2010-07-26
- CBSS, 2010d.** <http://www.cbss.org/Environment/creating-a-sustainable-baltic-sea-region> 2010-07-26

Baltic Sea States Subregional Co-operation (BSSSC)

BSSSC - founded in 1993 - is a political network that combines decentralized regional authorities in the ten countries bordering the Baltic Sea. The core in the organization consists of the Chairperson, the Board and the Secretariat. The Chair person is elected by the Board and holds this position for two years (BSSSC, 2010a). The Chairperson has the responsibility to promote the organization towards decision making bodies like for example the EU or the Council of the Baltic Sea States (CBSS). The Board is the decision making body of the organization. Two representatives with a regional political mandate from each member country are present in the Board. The Board decides every year the political activities for the next year.

At BSSSC's webpage it is written that the political activities “.. will be a combination of the priorities expressed by the national platforms and the annual work programme of the European Commission and the Council of Baltic Sea States (CBSS) and defines the work plan for the secretariat supporting the political priorities” (BSSSC, 2010a). The Secretariat's job is, as written, to follow the work plan that has been adopted by the Board. The Secretariat functions are to be a support to the Chairman as well as to the Board and to manage daily administration tasks. The Brussels Antenna is the organization's contact point with Brussels that is meant to “act as collector of and distributor of information in relation to the EU institutions”. Ad hoc groups can be set up by the Board that will work with specific issues. Every year, in autumn, the annual conference is arranged that is considered the main event of BSSSC. Regional representatives are the main target group but representatives from municipalities, governments and other organizations are also welcome at the Conference (BSSSC, 2010a). BSSSC consider itself as a regional partner to CBSS and has a purpose to transmit the interests of the sub regions to national governments or the EU (BSSSC, 2009). BSSSC has a working Group on Maritime Policy “with the aim to bundle and formulate the interests of the Baltic Sea regions in maritime policy and organize relevant political support” (BSSSC, 2010b). Members are Denmark, Norway, Germany, Poland, Sweden and Russia.

The group wants to cooperate with organizations and actors that are working with maritime issues in the Baltic Sea. The intention is to both bring political claims but also to work more concrete and support different projects. As one of the main objectives is a “Clean Baltic Sea” for example (BSSSC, 2010b), BSSSC developed, with the support of several other Baltic Sea organizations, a five point action plan called “Clean Baltic Shipping”. It was sent to EU as a proposal for a flagship project for the EU strategy for the Baltic Sea Region. It contains i.e. suggestions on voluntary agreements with ports organizations and with the cruise ship companies. The intention is to achieve a ban of waste-water discharged that is based on a voluntary basis (BSSSC, 2008a).

The organization has set up nine Key Priority Areas for 2009-2010 where Maritime Policy is one of the issues. According to the organization it has been an active part as a consultant in the process to develop the EU strategy. In the process a position paper was produced in cooperation with several Baltic Sea organizations (Euroregion Baltic, Baltic Development Forum, B7 Baltic Islands Network, CPMR Baltic Sea Commission and Union of the Baltic Cities). They welcome the strategy and hold the view that it should include an action plan, a strategy and an implementation plan. Especially the environmental state of the sea is mentioned as a focus area when it comes to improving the environmental state of the Region. The position paper recommends that the strategy shall support the BSAP. One of the areas of action suggested in the paper is “*Initiatives for establishing a structure of BSR coastal zone planning for a healthier water environment with a focus on the large hot spots of pollution on land as well as discharge from small diffuse sources*” (BSSSC, 2008b, p.4). In the position paper 13 proposals for flagships are presented that the organizations have agreed on. In their point of view concrete actions are needed in order to implement an EU-strategy.

The projects are only presented shortly in the paper but three of them are probably relevant for this case-study: *Maritime Safety and Security- Clean Baltic Shipping (mentioned above)* - to involve local and regional authorities as well as ship owners, ports and other stakeholder in the work to achieve a sustainable region and by 2015 make it “Europe’s maritime best practice region”. *Water Resources – Water Frame Directive* –to involve all relevant actors to improve water management and thereby reduce the discharges of nutrients and other hazardous substances. *Waste Water Treatment* –to involve authorities and other stakeholders in order to improve the water treatment and, with this, get a cleaner region (BSSSC, 2008b).

References

- BSSSC, 2008a.** Five-point Action Plan, Clean Baltic Shipping, proposal for a flagship project within the framework of the EU Commission’s initiative for an EU Baltic Sea Strategy <http://backweb.signalera.se/documents/48DD3BFA-E54C-4C50-A299-8FE883549B13.pdf>
- BSSSC, 2008b.** *A Competitive Region in a Globalized World*, Joint position paper on the EU Strategy for the Baltic Sea Region <http://backweb.signalera.se/documents/39AE9FF0-52C2-4AE6-B7D6-D49A0E14CBEC.pdf>
- BSSSC, 2009.** Work plan 2009-2010, BALTIC SEA STATES SUBREGIONAL CO-OPERATION (BSSSC) PRIORITIES FOR THE WORK PLAN 2009 – 2010 <http://backweb.signalera.se/documents/9D1040BE-C02A-42B0-933B-D577C7F4AB2B.pdf>
- BSSSC, 2010a.** <http://www.bsssc.com/section.asp?id=77&pid=77> 2010-07-29
- BSSSC, 2010b.** <http://www.bsssc.com/section.asp?id=1559&pid=91> 2010-08-07

National lobbying groups

LRF - Federation of Swedish Farmers (Lantbrukarnas Riksförbund)

LRF was formed 1971 by merging two organizations; one that had been a union for agricultural workers and the other an association for cooperative companies owned by farmers. LRF is an association for Swedish Farmers and cooperatives within the agricultural sector, such as Arla Foods. Today LRF has nearly 169 000 members, compared to the registrations of farmers at the Swedish Board of Agriculture who are about 75 000. This is explained by the fact that many members are within the forestry sector. The vision and goal for LRF is to contribute to development of businesses within the agricultural sector, so that their members' ambitions in economic growth, profitability and attraction can be fulfilled and capable to compete in the market. LRF works to promote what they call "the green industry" and influence policy decisions at local, regional, national and EU level, where an office in Brussels observes issues of interest. LRF is a consultative body for the Swedish authorities in agriculture.

The water issue is the environmental problem that LRF works mostly with. Since 1988 farmers are working upon a parliamentary resolution with a systematic program to reduce losses of nutrients. Measures are made in three categories:

- **Legislation** e.g. prohibition of manure application during autumn and winter, balance between phosphorus inputs and removals, rules for the size of manure tanks
- **Benefits from the EU for measures in water conservation** e.g. cultivation of catch crop, spring plowing, protection zones along water, construction of wetlands
- **Advice and education projects**

In 2001 a project in southern Sweden started called "Greppa näringen" or in English "Focus on Nutrients" as a support for farmers in reaching the national Environmental Objectives. To reduce losses of nutrients this project main objective is to increase knowledge and awareness by farmers by personal advising and consulting. Specific solutions are made for each farm. Now the project has expanded in geographical area so that the middle part of Sweden is included to. The project is a cooperation between LRF, the Swedish Board of Agriculture, the County Administrative Boards and advisory firms. The Swedish Board of Agriculture finance and has primary responsibility for the project and LRF promote this project towards their members and community agencies.

LRF have several seats in the board of the research foundation SLF, the Swedish Farmers' Foundation of Agricultural Research. LRF also collaborates with institutions at SLU, Swedish University in Agricultural Sciences and affect state funding for research by participating in letters to the ministry. In LRF's research strategy eutrophication of The Baltic Sea is mentioned as a future challenge for agricultural research and that LRF will contribute to a focus on research in this area.

About BSAP, LRF supports the ambition to reduce nutrients discharge in the Baltic Sea, but has several objections about the national suggestions of measurement produced by the Swedish Environmental Protection Agency. In essence, is the discontent against the injustice that Swedish farmers' previous steps against nutrient losses do not count when measures in water treatment does, and also that Swedish agriculture therefore is counted as equivalent to

other agriculture in the Baltic Sea area. LRF also criticize how the background value of phosphorus is calculated in the basis from BSAP and the fact that all calculations come from just one model.

REF???

MTT Agrifood Research Finland (Maa- ja elintarviketalouden tutkimuskeskus)

MTT Agrifood Research Finland is a research institute that was established in 2001 when two research institutions merged to form the institute (MTT, 2010a). The institute's research focus is on agriculture and food as well as the agricultural environment. The intention is that MTT's solutions on problems will mean use of renewable natural resources (MTT, 2010b). The defined mission is to promote *"the well-being of consumers, the competitiveness of the agricultural and food processing sector, sustainable use of natural resources, the quality of production and the natural environment, and rural vitality"* (MTT, 2009). MTT has about 850 employees, 45 percent of them are scientists and 15 percent are PhD students (MTT, 2010c).

The institute operates under the Ministry of Agriculture and Forestry and directly under the Ministry is the Board of Trustees. Sorted under the Board are the Director General as well as Executives and Board of Trustees' Work Committee (MTT, 2010d). There is also an International Scientific Advisory Board that consists of seven members that sit in the Advisory Board for a period of three year. Their task is to support the institute's strategic planning of and to assess MTT's research. The Board meets one or two times every year (MTT, 2010e). The Head office is located in the municipality Jokioinen, Finland, but the institute has totally fourteen other locations in the country. MTT uses a multi-disciplinary approach and the research is organized in programmes and areas. One of the research areas is Environmental research dealing with for example the water pollution that is the result of the agricultural sector and the food processing industry. MTT is engaged by a variety of different actors in for example the public sector and in the food industry (MTT, 2009).

The institute also cooperates with several other research institute and universities both in Finland and abroad (MTT, 2010f). There are eight research programmes that each contains different projects. A coordinator is in charge of each of the research programmes. He or she is responsible for the results and will ensure that the programmes are successfully completed (MTT, 2010g). One of the programme is "Water-friendly Agriculture". The objective of the programme *"is to promote the well-being of Finnish inland waters and the Baltic Sea by producing knowledge and creating solutions and new policy measures to reduce agricultural-based phosphorus and nitrogen loads while taking into account agricultural profitability and biodiversity issues"* (MTT, 2010h).

Eleven projects are listed as key-projects linked to this programme for example "Novel measures to reduce phosphorus load to inland waters", "Realistic targets and new options for nutrient-loss reduction from agricultural fields", "Future fertiliser products" and the project "Protection of the Baltic Sea: Benefits, costs and policy instruments". The last mentioned project aims *"to develop a simulation model that can be used in a cost-benefit analysis on combating eutrophication in the Baltic Sea"* (MTT, 2010i).

References

- MTT (2009). Annual Report 2009, https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about/annualreports/MTT_VK_2009_verkko_1.pdf
- MTT (2010a). https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about/history 2010-08-08
- MTT (2010b). https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about 2010-08-08
- MTT (2010c). https://portal.mtt.fi/portal/page/portal/mtt_sv/mtt/arbetsplats 2010-08-08
- MTT (2010d). https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about/organisation 2010-08-08
- MTT (2010e). https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about/organisation/sab 2010-08-08
- MTT (2010f). https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/about/internationalcooperation
- MTT (2010g). https://portal.mtt.fi/portal/page/portal/mtt_en/mtt/research 2010-08-08
- MTT (2010h). https://portal.mtt.fi/portal/page/portal/mtt_en/sustainableproduction/water-friendlyagriculture 2010-08-08
- MTT (2010i). https://portal.mtt.fi/portal/page/portal/mtt_en/sustainableproduction/water-friendlyagriculture/probaps 2010-08-08

MTK - The Central Union of Agricultural Producers and Forest Owners (Maa- ja metsätaloustuottajain Keskusliitto)

MTK is a Finnish organization representing the interests of farmers, rural entrepreneurs and forest owners. The organization “*strives for a countryside, which provides a good environment for working and running a business and an agreeable place for life and leisure*”. (MTK, 2010a). According to MTK, the organization “*represents an industry that uses renewable natural resources in a sustainable and economical way*” (MTK, 2010b).

MTK have about 156 000 members and the organization have fourteen provincial MTK unions. The Headquarters are located in Helsinki. The needs and wishes of its members are collected there to be presented as proposals to the EU. The EU’s agricultural policy is monitored by the Headquarter. Furthermore, together with the sister organization SLC and another organization (Pellervo), MTK has a representative at place in Brussels with the task to monitor what happens in the EC’s Committee of Agricultural organizations – COPA - as well as the EC’s General Committee for Agricultural Cooperation called COGECA. When topics relevant for the Finnish organizations arise it is on the representative to proclaim their wishes. The headquarters is also handling issues concerning the agricultural and forestry sectors on national level (MTK, 2010b).

A Commission is the highest decision-making body of MTK. There is also a Board of Directors that is the executive body of the organization. A management team and several committees are assisting the Board of Directors and have planning tasks in different sectors (MTK, 2010b).

MTK is, along with Farmer federations and unions in eight other countries in the Baltic Sea Region, a member of the Baltic Farmers Forum for the Environment (BFFE). The mission is to increase farmer organizations environmental work. As an observer in HELCOM, BFFE represent the farmers from the region (LRF, 2010).

Together with the Farmers federations in several other countries MTK is a partner in the “Baltic DEAL project- Putting Best Practices in Agriculture into Work”. The project is a voluntary initiative of these federations (EU Baltic net, 2010) and was in December 2009 sent as a proposal to the DG Region in Brussels. The intention with the project is to “*develop a common Baltic Sea region approach*” that will mean national adoptions and a wider range of advisory services and information regarding the connections between agricultural practices and the environment. The project is intended to be running 2010 to 2013 and will be a cooperation between relevant actors working with agricultural advisory services on national levels and the farmer federations in respective country (Hoffman, 2010). The strategic approach is “*to cost-effectively improve the environmental status of the Baltic Sea through reductions in nutrient losses from the agricultural sector, without impairing competitiveness or production*” (EU Baltic net, 2010). The Baltic DEAL project has now been approved as a flagship project under the EU strategy for the Baltic Sea Region. The project will result in i.e. a platform for farmers and the advisory institutions to meet that will continue even after the project has ended. Another result will be a network of demonstration farms showing best agri-environmental practices (EU Baltic net, 2010).

References

- Hoffman, M. (2010).** Newsletter of Baltic Farmers Forum on Environment (BFFE), January 2010 http://www.lrf.se/PageFiles/23947/BFFE_newsletter_0912.pdf
- MTK (2010a).** http://www.mtk.fi/MTK_briefly/mtkfacts/en_GB/facts_vision/ 2010-07-28
- MTK (2010b).** http://www.mtk.fi/MTK_briefly/mtkfacts/en_GB/mtkfacts/ 2010-07-28
- LRF (2010).** <http://www.lrf.se/Miljo/Vatten/Baltic-Farmers-Forum-on-Environment-BFFE/> 2010-07-28
- EU Baltic net (2010).** http://eu.baltic.net/Project_Database.5308.html?&&contentid=54&contentaction=single 2010-07-28

SLC - The central union of Swedish-speaking agricultural producers in Finland (Svenska Lantbruksproducenternas Centralförbund)

SLC was founded in December 1945 (SLC, 2010a). The organization has 14 000 members and is a smaller Swedish-speaking sister organization to MTK (that has a larger membership and is represented in the Finnish-speaking parts of the Country). Together, the both organizations’ member associations “*promote basic production and agriculture in cooperation with consumers for the benefit of Finnish food and employment*” (SLC, 2010b). SLC has four provincial unions in Finland dealing with information, training and management (SLC, 2010b).

A Delegation is the highest decision making body of SLC while the Board of Directors is the executive body. Several committees are assisting the Board of Directors. Different productions sectors (i.e. ecological production, milk, meat) are planned by the different committees. Together with MTK and Pellervo, SLC has a representative in Brussels to monitor that EU, the Finnish representatives as well as other relevant stakeholders knows the goals of Finland’s forest and agricultural policies (SLC, 2010b).

According to SLC they want to take a joint responsibility of the situation in the Baltic Sea together with the organization’s members as well as research institutes and consultation- and advisory services. In 2008, SLC and its members focused on water issues and how farms can reduce the nutrient loads affecting watercourses. Information activities were arranged both on

national and regional levels. The campaign was called *Gemensamt ansvar för Östersjön* (directly translated: Shared responsibility for the Baltic Sea) (SLC, 2010c). Examples on SLC's activities under the campaign are: an expert seminar for people within SLC, relevant authorities as well as the organizations different partners on how the Finnish agricultural sector affects the Baltic Sea, information to SLC's members on the meetings of the organizations local departments and continued cooperation in BFFE-Baltic Forum for Environment (SLC, 2008). A brochure, with the same name as the campaign, was produced in order to be able to inform the public and the members of SLC on these issues after the project was ended (SLC, 2010c).

References

- SLC (2008). *Gemensamt ansvar Östersjön 2008 – åtgärdsprogram* <http://www.slc.fi/files/atgardsprogram.pdf>
- SLC (2010a). <http://www.slc.fi/historik.asp> 2010-08-03
- SLC (2010b). <http://www.slc.fi/english.asp> 2010-08-03
- SLC (2010c). <http://www.slc.fi/ostersjon.asp> 2010-08-03

Non-Governmental Organisations

International environmental NGOs

WWF (World Wide Fund for Nature)

WWF is an international organization with 90 offices located in more than 40 countries. These network of offices run different projects. Totally 100 countries are involved in a WWF project. The first office was established in Switzerland in 1961 and the country is now the place for a central secretariat. The organization's overall goal is "*to stop the degradation of the planet's natural environment to build a future in which humans live in harmony with nature*".. WWF cooperates with a wide range of actors such as for example the UN, the World Bank as well as different companies (WWF, 2010a). A Board of Trustees, led by an international president, is the governing body of the organization and meets four times per year. There is also a council which acts as an intermediary between the national organizations and the international board. For example it transmits views and needs of the national organizations to the board (WWF 2010b). The offices around the world work *i.e* with field projects, research and consultation for policy-making on local and national levels. The office in Brussels is working to influence EU, whilst the office in Washington is specialized in economic issues on the global level (WWF, 2010c). The organization arranges for example roundtables to bring different stakeholders together. WWF is financed by a lot of actors for example: individuals, foundations, governments and companies (WWF, 2009a). According to the organization almost all work build on collaboration with other partners (WWF, 2010g).

A Baltic Ecoregion Programme was established in 1991 with the mission to "*save the Baltic marine environment and restore vitality and beauty of the surrounding region*" (WWF, 2010d, p.8). The programme is part of a network of experts that work to promote cooperation between different regional actors. The intention for WWF is to work with a wide range of actors and stakeholders in order to increase awareness and spread ideas. The programme is active in all countries bordering the Baltic Sea. The eutrophication problem is considered to be the most serious threat to the sea and the programme cooperates with other actors to influence changes of agricultural policies. Support is also given to farmers in order to reduce

the impact the agricultural sector has on the eutrophication effect. For example, WWF assist in restoration of wetlands (WWF, 2010d).

Further, WWF has, together with some partners (for example the Federation of Swedish Farmers – LRF), launched the Baltic Sea Farmer of the Year Award Competition - arranged once a year - to show that each individual farmer can contribute to the work if he or she change farming practices. National winners are designated by national juries consisting of both WWF and partner organizations as well as representatives from the agricultural sector and different advisory bodies. A regional winner is then chosen from the national winners by an international jury. According to the farmers interviewed by WWF there is a lack of knowledge of the correlation between agricultural practices and the health status of the Baltic Sea and there is a willingness to learn more about techniques to protect it. The competition is therefore intended to be a way to spread knowledge and a source of inspiration for farmers. WWF hopes for an increase of partnerships between farmers and other actors in the society by launching the competition (WWF, 2009b).

Even though WWF encourage change in farmers farming practices the organization don't blame the single farmer for the situation. Instead, WWF considers the agricultural sector to be mainly responsible for the problem and specifically the EU's common agricultural policy (CAP) with its focus on intensive agriculture. The organization calls the grant schemes "out-of date". The current arrangements are not sustainable according to WWF. Therefore, the organization demands a change in CAP so that subsidies that are paid come with a demand for environmental measures (WWF, 2010e). WWF concludes that a reform in the CAP has started but a lot more work has to be done. Therefore the organization calls on the decision makers on national and EU-level to be engaged in the reform to develop the new EU-budget and work together with other stakeholders such as farmers and NGOs. WWF, through the Baltic Ecoregion Programme, propose a transition to a new *Common Environment and Rural Policy* (CERP) that consists of certain principles. Two of the main principles are "*the Polluter Pays Principle*" and "*Public Payments for Public Goods*". The latter means that farmers shall get money for creating public goods; that is for example habitat protection or for the work to maintain the cultural landscape. WWF wants the new policy to be implemented by 2019 (WWF, 2009b). Some suggestions on activities that could be encouraged by payments (called *Basic Area payments* and *Targeted Support Payments*) are listed by WWF in the publication "A Common Environment and Rural Policy". In WWF's vision the new policy, if it will come true, would lead to sustainable management of land that will decrease the eutrophication effect (WWF, 2010f).

WWF wants the national level to work actively with these issues, for example WWF calls on Sweden to work actively both nationally, regionally and within EU to reduce the amounts of nutrients leaking to the sea. The organization wants the Ministry of Agriculture as well as the Swedish Board of Agriculture to be active in the work to save the Baltic Sea. The organization also suggests other actions such as to restore lakes and wetlands (WWF, 2010e).

According to WWF the programme has been successive in several cases: for example by being an partner in the establishment of the EU Strategy for the Baltic Sea as well as the Baltic Sea Action Plan, by succeeding to get some of the producers of detergents to avoid phosphates in their products and by getting members of the ferry industry to stop discharging wastewater in the Sea, the latter by working in cooperation with ferry lines and cruise companies (WWF, 2010d).

References

- WWF (2009a). *WWF Annual review 2009 INT*, published in March 2010, Gland, Switzerland http://assets.panda.org/downloads/wwf_int_ar_a4_di10_low_res.pdf
- WWF (2009b). *WWF Baltic Sea Farmer of the Year Award 2009*, WWF Baltic Ecoregion Programme http://www.wwf.se/source.php/1270504/Baltic%20Sea%20Farmer%20Award%202009_rapport.pdf
- WWF (2010a). http://wwf.panda.org/wwf_quick_facts.cfm 2010-06-17
- WWF (2010b). http://wwf.panda.org/who_we_are/organization/statutes/ 2010-06-17
- WWF (2010c). http://wwf.panda.org/who_we_are/organization/ 2010-06-17
- WWF (2010d). *Together we can save the Baltic Sea*, WWF Baltic Ecoregion Programme 2010 <http://www.wwf.se/source.php/1295791/togetherwecansavethebalticsea.pdf>
- WWF (2010e). <http://www.wwf.se/v/hav-kust/1007228/1133391-ostersjon-overgodning> 2010-06-17
- WWF (2010f). *A vision for a new contact between land-managers and society, A Common Environment and Rural Policy*, WWF Baltic Ecoregion Programme 2010 http://www.wwf.se/source.php/1295846/A%20Common%20Environment%20and%20Rural%20Policy_2010.pdf
- WWF (2010g). http://wwf.panda.org/who_we_are/ 2010-06-30

CCB - Coalition Clean Baltic

CCB is an international network organization consisting of environmental NGOs from countries around the Baltic Sea. It was formed in Helsinki 1991 and unites 27 member organizations which combined have over half a million members. Their main goal is “promote the protection and improvement of the Baltic Sea environment and natural resources” (CCB 2010a). To achieve membership in CCB certain criteria must be fulfilled for the applicant organization. It should be a non-profit environmental NGO situated in the Baltic Sea Region with comparable goals due to CCBs mission. The applicant organization should also be democratic and have a wider range of approach then local (CCB 2002). The CCB board contains of a chairman and ten board members from different countries with member organization. The chairman and board members is elected at the CCB Biannual meetings (CCB 2010b).

CCB works with lobbying, information, co-operation in field projects and support to member organizations. Their priority areas are: “Promotion of good ecological water status”, “Prevention of installation and transports harmful to the Baltic Sea environment and coastal areas” and “Development of sustainable Baltic Sea fisheries” (CCB 2010a). Promotion of good ecological water status is the priority area that deals with eutrophication, and within this priority area there are three Sub Areas called: “Promotion of Sustainable wastewater treatment”, “Promotion of Sustainable River Basin Management” and “Promotion of Water Protection Measures in Agriculture”. Every Sub Area has a lead party and activities connected to short-term goals (CCB 2010c).

Promotion of Sustainable wastewater management

Lead party: CCB Secretariat. Goals and activities: mainly focused on support and information about ecotechnological solutions in wastewater treatment (CCB 2010d).

In collaboration with EEB (European Environmental Bureau) they have arranged seminars regarding waste water management and Water Framework Directive (EEB 2002).

Promotion of Sustainable River Basin Management

Lead Party: Friends of the Baltic (Russia). Goals and activities: raising awareness and monitor the implementation of Water Framework directive (CCB 2010e).

A guide and checklist for NGOs is produced, to be used when monitoring all River Basin Management Plans (CCB 2007).

Promotion of Water Protection Measures in Agriculture

Lead Party: Polish Ecological Club, PKE (Poland). Goals and activities: Promote organic farming, lobby EU and governments in the Baltic Region (especially Poland) and spread information among member organizations in CCB (CCB 2010f).

Produce reports that can be used in discussions with authorities, for example Skorupski et al. 2007 and Lobanov 2009, which describe how regulations and manure practices for industrial swine and cattle farms differ between countries in the Baltic Sea Catchment Area.

According to CCB: Achievements and actions within eutrophication

- Involved in river-watch programs in Belarus, Estonia, Latvia, Lithuania, Poland and Russia
- Promotes via exhibitions, folders, books and seminars development of sustainable wastewater solutions. Co-operation with municipalities in the Baltic Sea Area.
- Organization of the Baltic Sea Ship Campaign in Sweden, Finland, Latvia, Estonia, Lithuania and Russia. Information about the Baltic Sea environment and how to protect it.
- Several proposals for sustainable wastewater management have led to improvement of HELCOMs recommendations of on-site wastewater treatment.
- New Polish legislation for organic farming was affected of proposals from members of CCB.
- Proposals that led to the first joint ministerial meeting with the Baltic Ministers of Environment and Agriculture to discuss eutrophication due to nutrient run-off from agriculture.
- Highlighted nutrient losses from intensive rearing of animals which led to the Baltic Industrials Hot Spot list in HELCOMs Baltic Sea Action Plan 2007 and strict manure regulations for this. (CCB 2010g)

References

CCB (2002). *Draft Membership Criteria for CCB*. http://www.ccb.se/pdf/Membership_Criteria_02.doc.pdf 2010-06-07.

CCB (2007). *Checklist for Environmental Citizens' Organisations in the Baltic Sea Region on Good River Basin Management*. <http://www.ccb.se/ccbpubl.html> 2010-06-14.

CCB (2010a). *About CCB*. <http://www.ccb.se/about.html> 2010-06-07.

CCB (2010b). *CCB Board*. <http://www.ccb.se/board.html> 2010-06-15.

CCB (2010c). *CCB Priority Areas*. <http://www.ccb.se/priority.html> 2010-06-14.

CCB (2010d). *CCB Sub Areas: Sustainable wastewater management.* <http://www.ccb.se/pa01.html>. 2010-06-14.

CCB (2010e). *CCB Sub Areas: River Basin Management.* <http://www.ccb.se/pa02.html>. 2010-06-14.

CCB (2010f). *CCB Sub Areas: Water Protection measures in Agriculture.* <http://www.ccb.se/pa03.html> 2010-06-14.

CCB (2010g). *CCB Achievements.* <http://www.ccb.se/achievements.html> 2010-06-09.

EEB (2002). *Report from the EEB/CCB Water Seminar, EEB Publication number 2002/020.* <http://www.ccb.se/ccbpubl.html> 2010-06-14.

Lobanov E. (2009). Report on industrial pig-farms in the Baltic Sea catchment area of Belarus. <http://www.ccb.se/ccbpubl.html> 2010-06-14.

Skorupski J. et al (2007). *Report on industrial swine and cattle farming in the Baltic Sea catchment area.* <http://www.ccb.se/ccbpubl.html> 2010-06-14.

Keep Baltic Tidy (KBT)

KBT is described as a network, founded in 1993, that consists of six member organizations in Estonia, Finland, Latvia, Lithuania, Russia and Sweden. The intention is to develop and work with environmental projects aimed at private persons in order to promote sustainable development in the region (Keep Baltic Tidy, 2010a).

The members are thus far from specifically focused on eutrophication issues but they have for example worked with wastes from ships in the Baltic SeaBreeze project (2005-2007). The goal with the project was to change behaviors and attitudes of seamen, fishermen and others that work at the Baltic Sea or spending time there as a leisure activity, in order to reduce the pollution that negatively affects the Sea. Baltic SeaBreeze was partly financed by EU Interreg IIIB Baltic Sea Programme. Leading party was the member organization in Sweden -Keep Sweden Tidy (in Swedish *Håll Sverige rent*) (Keep Baltic Tidy, 2010b) that had the overall responsibility and run the project with 33 partners from countries bordering the Baltic Sea (Håll Sverige rent 2010a). In the project, the Baltic Blue Flag was established as an international Environmental Award for ports, beaches as well as private persons that take on an environmental responsibility i.e. not to discharge toilet tanks in sensitive areas (Håll Sverige Rent, 2010b).

Currently a secretariat is located in Sweden and is consisting of a President, a Secretary General, Vice president and a Project Manager. The first three mentioned is sitting in the executive board along with a fourth person. The Secretariat is however shifting between the member organizations in Sweden and Finland on a regular basis (Keep Baltic Tidy, 2010c)

References

Håll Sverige Rent, 2010a. <http://www.hsr.se/sa/node.asp?node=1453> 2010-07-23

Håll Sverige Rent, 2010b. <http://www.hsr.se/sa/node.asp?node=207> 2010-07-23

Keep Baltic Tidy, 2010a. <http://www.keepbaltictidy.org/sa/site.asp?site=2065> 2010-07-23

Keep Baltic Tidy, 2010b. <http://www.keepbaltictidy.org/sa/node.asp?node=2279> 2010-07-23

Keep Baltic Tidy, 2010c. <http://www.keepbaltictidy.org/sa/node.asp?node=2280> 2010-07-23

Philanthrocapitalistic NGOs

Baltic 2020

Baltic 2020 is a private foundation that was established in 2005 by Björn Carlsson with his donation of 500 million SEK. The idea is to use the assets until 2020 by financing innovative projects that will increase the knowledge of the Baltic Sea (Baltic 2020, 2009a). The overall objective is to promote projects which in all probability can lead to positive, and not negative, effects for the environmental status of the Baltic Sea. Baltic 2020 finance both research projects to establish new knowledge, projects that examine existing knowledge and projects concerning information spreading and how to influence the public and the decision makers in the right direction. The Foundation has chosen eutrophication to be one of the focus areas and granted 28.7 million SEK to 17 eutrophication related projects between 2006-2009 (Baltic 2020, 2009b).

The Foundation's Board consists of seven members that meet a few times per year. For example in 2008 they held meetings six times (Baltic 2020, 2009b). It is the Board that decides what project the Foundation is going to support but the employees and experts are also involved in the process. When the Foundation starts up a project it contacts scientists and other people that can lead it. But Baltic 2020 can also provide grants after receiving applications from scientists that seek financial support for their own projects (mail 2010-09-09). An office is located in Stockholm with four employees: an executive director, a Project Manager for Eutrophication, a Programme Director and a person responsible for Information and Events (Baltic 2020, 2009c).

In the Foundation's initial phase, the Royal Swedish Academy of Science assisted the Foundation to set up a Scientific Council of researchers with the task to give the Baltic Sea 2020's Board information and analysis of the environmental situation of the Baltic Sea. Several international scientific workshops were arranged. This has led to what the Foundation calls a "network of scientists" that can be consulted for evaluation of projects (Baltic 2020, 2009d). The work proceeded with reviews on main reasons for eutrophication and discussions on possible cost-effective solutions. These initial reviews resulted in a decision to work for a ban of phosphates to be used in laundry and dish-washing detergents. Another main issue in the beginning was the problem with oxygen-deprived sea beds. This led to interdisciplinary workshops arranged by Baltic 2020 where experts and scientists from countries bordering the Baltic Sea, as well as other parts of the world, were invited to discuss the problem as well as possible solutions. This resulted in guidelines of cost-effective ways to proceed that is; what sort of projects to focus on. The final report of the workshops identified the coast zones and the work there by animals and plants to absorb the nutrients to be specifically important. Thus, the Foundation's focus is to reduce the load of nutrients from land to sea by projects that increase the potential of the coast to absorb phosphorus and nitrogen. The Foundation initiated five projects in 2008-2009 dealing with these issues, for example a study of the possibility to use mussels as a way to absorb the nutrients (the so called "Environmental Mussels"). Another study is to review how - in a cost-effective way - to reduce the nutrients leaking from pig farms. The latter is a part of a 10-year program that will start 2010 called "*Intensive Pig Production Program – from devastating pollution to sustainable and inventive solutions*". The intention within the program is to work for stricter legislation - i.e. regulations in the revision of the IPPC-directive's (Directive on integrated pollution prevention and control) guidelines so that nutrient leakage from animal farms is prevented more efficiently. Baltic 2020 will also work for a spreading of knowledge regarding these issues (Baltic 2020

2006-2010). The foundation also oversees other relevant policies or Documents such as the “Baltic Sea Action Plan and the EU Baltic Sea Strategy (Baltic 2010, 2009e).

Baltic 2020 was also intended to be involved in a joint project with the John Nurminen Foundation called “Clean Baltic Sea-Poland”, with the aim to improve the waste water treatment in the Country by removing phosphorus from the outgoing water of the waste water treatment plants. Implementation was planned to 2008-2013 and divided in three phases beginning with the City of Warsaw (the pilot project) as phase one and continuing phase two and three with other selected cities (defined as project partners). A Clean Baltic Sea fund was established by Baltic 2020 and the John Nurminen Foundation (Baltic 2020, 2008). However, Baltic 2020 is no longer part of the project. According to a mail from the Foundation, the pilot study led to the conclusion that the original plan wasn’t relevant. Therefore there was no basis for the Foundation's participation in the project.

References

Baltic 2020, 2006-2010. WORK TO REDUCE EUTROPHICATION, 2006 TO 2010 http://www.balticsea2020.org/attachments/138_Eutrophicationwork.pdf

Baltic 2020, 2008. CLEAN BALTIC SEA PROJECT, Accelerated Phosphorus Removal from Municipal Wastewaters in Poland http://www.balticsea2020.org/attachments/101_Clean%20Baltic%20Sea%20Project.pdf

Baltic 2020, 2009a. http://www.balticsea2020.org/index.php?option=com_content&view=article&id=133&Itemid=93&lang=en 2010-06-29.

Baltic 2020, 2009b. http://www.balticsea2020.org/index.php?option=com_content&view=article&id=164&Itemid=111&lang=en 2010-06-29.

Baltic 2020, 2009c. http://www.balticsea2020.org/index.php?option=com_content&view=article&id=148&Itemid=63&lang=en 2010-06-29.

Baltic 2020, 2009d. http://www.balticsea2020.org/index.php?option=com_content&view=article&id=146&Itemid=100&lang=en 2010-06-29.

Baltic 2020, 2009e. http://www.balticsea2020.org/index.php?option=com_content&view=article&id=183&Itemid=109&lang=en 2010-06-29.

Mail from Baltic 2020, 2010-09-09.

Baltic Sea Action Group, BSAG

BSAG, is a part of “the Foundation for a Living Baltic Sea”, which has a purpose to “...support and promote nature and human welfare, and thus preserve and promote the Finnish cultural heritage.” The foundation support and initiate scientific work related to its purpose and unite different actors within the society to achieve actions and projects where best practice is used. It also stimulates cooperation between different actors by promoting information flow. Their mission is “a holistic overview and well targeted concrete actions” (BSAG, 2010a).

Preparations of the foundation were made during 2007 and in 2008 it was registered by Ilkka Herlin (Chairman of the Board of Trustees), Saara Kankaanrinta (Secretary-General) and Anna Kotsalo-Mustonen (BSAG, 2010b).

BSAG is organized in three parts:

Board of Trustees: with three members and has the legal responsibility of the foundation.

International Advisory Board: consisting of eight members. Chairman is Tarja Halonen, president of the Republic of Finland and the other members are representatives from HELCOM, different governments, business and finance sector. This board has influence in decisions and speeds up the implementation thru networks and expertise.

Core group of the foundation: with the two co-founders mentioned above and has operative management (BSAG, 2010c).

A pool of international Baltic Sea experts is linked to BSAG to be used as consultants regarding eg. projects, and this pool enables a quick contact line for even more experts. This makes also BSAG an active link between the civil society, decision makers and researchers (BSAG, 2010a). Since BSAG work like a coordinator between actors they rarely give financial support or lead projects by themselves. In some cases though, BSAG initiates and leads project as it is difficult to find a leading actor and the problem is essential to solve. The projects are then evaluated by the board and a list of questions regarding the problem is answered (Kankaanrinta, 2010). BSAG has about 10 employees, but has also help from volunteers sometimes when commitments from BSAS contains donation of work or expertise in different areas. The office is located in Helsinki (Kankaanrinta, 2010).

Projects BSAG is involved in, regarding eutrophication:

Poultry manure treatment project in Leningrad region. Since 80 000 tons of untreated manure from poultry in this region farms is produced each year, contribution to eutrophication of the Gulf of Finland is high. A pilot project in one of the largest farm at Leningrad Oblast is started with dung processing plant that will reduce nutrient load in water and at the same time contribute to a source of energy in the surrounding area (BSAG, 2010d).

The Port Waste Reception (PWR) Project. The project aims to ensure that proper equipment for waste and waste water reception will be installed in all Baltic main ports. Bain and Co/Nordic, an international consultant company handles the project and for the moment the cruise port in St. Petersburg and the port of Copenhagen/Malmö are involved.

Baltic COMPASS – Sustainable agriculture in the whole Baltic Sea region. This is a strategic project that will focus on a broader and more harmonized application of already known policies, technologies and measurements in agriculture that will reduce nutrient loads. EU and partners representing authorities, interest organizations and innovation centers from several states in the Baltic region are helping and finance the project (BSAG, 2010c).

Baltic Sea Action Summit, BSAS, was held 10 February 2010 in Helsinki and was organized by BSAG, the president and the prime minister of Finland. In order to realize the HELCOM's Baltic Sea Action Plan (BSAP) as quick and effective as possible, representatives for governments, business leaders, NGOs and the civil society was invited to discuss the future of the Baltic Sea and prepare collaborations. The invitees were also urged to make personal commitments in order to contribute to the fulfillment of HELCOM's BSAP (BSAS, 2010a). BSAG want to work as a catalyst with this arrangement and they also monitor commitments made, through follow up the scheduled milestone activity every commitment contains (BSAG 2010c).

Commitments

There are a lot of commitments made about eutrophication, of various kinds and significance. Some examples down below are given in different areas:

Agriculture: *Kosken Kartano – a Baltic Sea Action Farm*, commitment made by Kosken Kartano – Koskis Gård. The commitment aims to set up rules for farms in Finland and in other countries around the Baltic Sea providing a BSAF-certificate that will reduce the nutrient load from agriculture. This includes cooperation with MTK, the farmers union in Finland, Land Owner organizations as well as nature conserving organizations. <http://www.bsas.fi/commitments/all-commitments/kosken-kartano-a-baltic-sea-action-farm>.

Energy and Nutrient Flows in the Food Chain. The Big Picture is Missing, by Tritonet Ltd., a water- and environment company designing management solutions within this sector. <http://www.tritonet.fi/index.php?sivu=35201>. Make a study in order to produce a tool which can be used to evaluate biomass production, food production and consumption over selected areas of different size. <http://www.bsas.fi/commitments/all-commitments/energy-and-nutrient-flows-in-the-food-chain-the-big-picture-is-missing>. 2010-06-29.

Technical and commercial assistance waste manure treatment for BSAG, by City of Helsinki, Helsinki Energy. Support projects about converting manure to biogas by technical assistance and experience that can be used in *Poultry manure treatment project in Leningrad region* mentioned above. <http://www.bsas.fi/commitments/all-commitments/technical-and-commercial-assistance-concerning-waste-manure-treatment-for-bsag>. Commitments are also made by HELCOM and the Russian General Director Leonid Korovin to assist in communication and information exchange with Russian authorities for implementation of this project. <http://www.bsas.fi/commitments/all-commitments/assistance-in-review-the-current-manure-waste-treatment-in-poultry-plants-and-farms-to-facilitate-the-start-up-of-the-investments-in-sustainable-technology-solutions-in-the-handling-of-the-manure-waste>. 2009-07-02.

Maritime industry: *Developing technologies for oxygenation of hypoxic bottom areas, reducing environmental impact from ships and large-scale mussel farming in the northern Baltic Sea*, by Government of Åland. A commitment divided in three different parts: i) Financial support for research aiming to reduce the internal load in the archipelago and in wave-power technologies used for oxygenation of hypoxic bottoms. This includes collaboration with Stacko Ab and Gotland University. ii) Together with stakeholders and other participants work to find solutions within the Clean Shipping-priority area in EU:s Baltic Sea Strategy. iii) Launch pilot project for large-scale mussel farms in Åland, to conduct increased nutrient cycling. This will be done in collaboration with similar projects in Sweden. <http://www.bsas.fi/commitments/all-commitments/developing-technologies-for-oxygenation-of-hypoxic-bottom-areas-reducing-environmental-impact-from-ships-and-large-scale-mussel-farming-in-the-northern-baltic-sea>.

Commitment to NSF concept, by Passenger Port St. Petersburg “Marine Façade”. Provide facilities and services for waste water reception from ferry and cruise ships due to the fair No-Special Fee concept <http://www.bsas.fi/commitments/all-commitments/commitment-to-nsf-concept>.

Greener Shipping – Baltic Leadership, by Det Norske Veritas (DNV). Establish an overview of today’s emissions from shipping in the Baltic Sea. In co-operation with governments, LNG-terminals, ports and other stakeholders provide solutions for a faster transition to a more effective and cleaner shipping industry <http://www.bsas.fi/commitments/all-commitments/greener-shipping-baltic-leadership>.

Awareness rising: *Baltic Sea Action Programme*, by the Finnish Association for Nature Conservation. To make a roadmap with suggested initiatives that will improve the Baltic

Sea's condition. The programme is directed to all Finns and the Central Union of Agricultural Producers and Forrester Owners (MTK) is a possible co-operator. <http://www.bsas.fi/commitments/all-commitments/baltic-sea-action-programme>.

References

- BSAG, 2010a.** About BSAG. <http://en.bsag.fi/bsag>. 2010-07-02.
BSAG, 2010b. Founders, International Advisory Board and Board of Trustees. <http://en.bsag.fi/bsag/founders-international-advisory-board-and-board-of-trustees> 2010-07-01.
BSAG, 2010c. Commitment book. <http://www.bsas.fi/commitments>, 2010-07-05.
BSAG, 2010d. Actions. <http://en.bsag.fi/actions/agriculture-and-bioenergy> 2010-07-01.
BSAS, 2010a. Åtagande för Östersjön. <http://www.bsas.fi/swe> 2010-07-02.

Kankaanrinta Saara 2010. Secretary-General BSAG, e-mail 8 July.

John Nurminen Foundation

The Foundation was founded in 1992 and started as an initiative by the John Nurminen family Company –an enterprise established in 1886 as a shipping house and trading company (John Nurminen Foundation, 2010a). The Board consists of eight members that meet about seven times per year. It is the Board that decides how the assets are used (the Board has also the possibility to authorize another body to make such decisions). It is the Board that “*determines the Fund's projects, sets their goals and monitors their implementation on a regular basis*” (John Nurminen Foundation, 2010b). The Foundation has an office that is located in Helsinki. The operational work is led by a Secretary General. In addition to his work, ten people are employed here with different responsibilities. For example there are two Project Managers for the PURE-project (John Nurminen Foundation, 2010m).

Environmental work is one of the two key areas of the Foundation and is organized through the Clean Baltic Sea Projects (John Nurminen Foundation, 2010a). The funding is possible through donations to the Foundation by individual people and companies (John Nurminen Foundation, 2010c). The projects can either be supported just financially or that an enterprise offers its business skills (John Nurminen Foundation, 2010d). The public sector is also funding several projects (John Nurminen Foundation, 2010c). Eutrophication and Tanker Safety are the two focus areas (John Nurminen Foundation, 2010a). The Foundation began to work with these issues in 2004 when the Board asked leading experts for advice how the Foundation could contribute in the work for a healthier Baltic Sea. Increased phosphorous removal in wastewater treatment plants was, by the experts, considered as the fastest and most cost-effective way to improve the environmental status of the Sea. As a result, improvements began with wastewater treatment plants in St. Petersburg (John Nurminen Foundation, 2010e). The Clean Sea Eutrophication Projects' goal is to make the phosphorous removal so effective that the maximum level is 0.5 mg phosphorous/litre in the outgoing water. This amount is the recommended level set by HELCOM (John Nurminen Foundation, 2010f). The projects in St. Petersburg are organized in cooperation with Vodokanal – that is; St Petersburg waterworks. The work began in 2007 with the largest wastewater treatment plant in the city and will continue, in the end of 2010, in two other plants in St. Petersburg. The Foundation has the responsibility of equipment procurement and the investment's technical planning as well as the delivering of material to the plants. The Foundation shares the costs with Vodokanal. The Swedish International Development Agency and the Finnish Ministry of the

Environment have been supported the investments financially (John Nurminen Foundation, 2010g).

The Foundation has also recently, in February 2010, signed an agreement for cooperation with a city near St. Petersburg called Gatchina, in order to start up a phosphorous removal project (John Nurminen Foundation, 2010g). But the Foundation is not working exclusively in Russia. In 2009 an agreement was signed with the wastewater treatment plant in Riga to intensify the removal of phosphorous in the wastewater treatment process (John Nurminen Foundation, 2010h). The John Nurminen Foundation has also worked together in 2008 with the Swedish Foundation - Baltic Sea 2020- to improve the phosphorous removal in a wastewater treatment plant in Poland (John Nurminen Foundation, 2010i). However, the Baltic 2020 has now after the pilot study chosen not to no longer be part of the project (mail 2010-09-09).

The Foundation is also a partner of the EU-funded PURE-project – a cooperation project between UBC (lead partner), John Nurminen Foundation, HELCOM and the waterworks in Jurmala, Riga, Szczecin, Brest, Kohtla-Järve and Lübeck . The two cities Gdansk and Mariehamn in Poland are also participating. The project aims to intensify phosphorous removal and to study wastewater sludge management. Further the PURE-project “.. *aims to promote the dissemination and implementation of information and good practices related to phosphorous removal in cities located in the catchment area of the Baltic Sea*” (John Nurminen Foundation, 2010j).

The Foundation selects its projects on the basis of the largest improvements for the environmental status of the Sea to the lowest price. An advisory expert group assists the Board in the selection process (John Nurminen Foundation, 2010k). The Group consists of people from the Finnish Environment Institute, the Finnish Ministry of the Environment and Ministry for Foreign Affairs, the Nordic Investment Bank and the WWF (John Nurminen Foundation, 2010l).

References

- John Nurminen Foundation, 2010a.** <http://www.johnnurminenfoundation.com/> 2010-09-10.
- John Nurminen Foundation, 2010b.** <http://www.puhdasitameri.fi/en/board> 2010-09-10.
- John Nurminen Foundation, 2010c.** <http://www.puhdasitameri.fi/en/funding> 2010-09-10.
- John Nurminen Foundation, 2010d.** <http://www.puhdasitameri.fi/en/principles-of-partnership> 2010-09-10.
- John Nurminen Foundation, 2010e.** <http://www.puhdasitameri.fi/en/eutrophication-69> 2010-09-10.
- John Nurminen Foundation, 2010f.** <http://www.puhdasitameri.fi/en/aims> 2010-09-10.
- John Nurminen Foundation, 2010g.** <http://www.puhdasitameri.fi/en/russia> 2010-09-10.
- John Nurminen Foundation, 2010h.** <http://www.puhdasitameri.fi/en/the-baltic-states> 2010-09-10.
- John Nurminen Foundation, 2010i.** <http://www.puhdasitameri.fi/en/poland> 2010-09-10.
- John Nurminen Foundation, 2010j.** <http://www.puhdasitameri.fi/en/eu-project-pure> 2010-09-10.
- John Nurminen Foundation, 2010k.** <http://www.puhdasitameri.fi/en/operational-model-borrowed-from-the-business-world> 2010-09-10.
- John Nurminen Foundation, 2010l.** <http://www.puhdasitameri.fi/en/advisory-group> 2010-09-10.
- John Nurminen Foundation, 2010m.** <http://www.johnnurmisenfaat.io.fi/?cat=4> 2010-08-11.

International financial institutions

The Nordic Environment Finance Corporation (NEFCO)

NEFCO –established 1990 by the Nordic countries - is a finance institution on the international level. The headquarters is located in Helsinki. NEFCO defines its mission as “*to promote cost-effective ways to reduce the environmental pollution emanating from regions adjacent to the Nordic countries*” (NEFCO, 2010a). The institute works in collaboration with different funding institutions. A project is often a partnership between NEFCO and a company. According to NEFCO it is the company that “owns” a project (NEFCO, 2010b). The Board of Directors consists of two representatives from each Nordic Country’s Ministry of Environment. Two observers – one from the Nordic Council of Minister and one from the Nordic Investment Bank –are also present in the Board (NEFCO, 2010c). Projects financed by NEFCO are reviewed by the NEFCO staff (with the support of external technical consultant) to see if the criteria set up by NEFCO are met before they are presented to the Board (NEFCO, 2010d).

The focus, so far, has been on countries in Central and Eastern Europe and the ecological status of the Baltic Sea is among the prioritized topics. Currently about 350 projects are active, dealing for instance with issues regarding agriculture and water treatment (<http://www.nefco.org/introduction> e.g. up-grading of Wastewater Treatment Plants. Reducing nutrients in the outgoing water is a prioritized effect in this work. Together with the European Commission NEFCO has financed a pilot study, by the firm COWI, to evaluate the wastewater treatment in Kaliningrad and its surrounding areas in order to see what investments that can be done to modernize the treatment plants. NEFCO has also supported the local operator of the Wastewater Treatment Plant in Murmansk (a project partial financed by NEFCO) and hired consultants to assist in the work to develop an investment program that will deal with cost-effective, needed measures (NEFCO, 2010e).

NEFCO is managing several different funds. The Agri Credit Facility is a program that is a part of the Nordic Environmental Development Fund. Under the program NEFCO is involved in small scale financing when it comes to investments in systems for manure handling. Among the project criteria is that the projects must lead to great reductions of phosphorus and nitrogen discharges (NEFCO, 2010f).

Together with the Nordic Investment Bank, NEFCO also manage the BSAP trust Fund. Grants are given for technical assistance in the projects that work with issues that are relevant for the implementation of the BSAP. Sweden and Finland have committed 9 respective 1.6 million Euro to the Fund. The agricultural as well as the wastewater treatment sector can be supported by the fund. NEFOC writes: *A key purpose of the fund is to facilitate and speed up the preparation of bankable projects* (NEFCO, 2010g). Another of NEFCO’s funds is *The Investment Fund* focusing on environmental projects with great regional positive effects i.e reducing pollution in the Baltic Sea (NEFCO, 2010h).

References

- NEFCO, 2010a. http://www.nefco.org/introduction/mission_and_strategy 2010-07-27
NEFCO, 2010b. <http://www.nefco.org/introduction> 2010-07-27

NEFCO, 2010c. http://www.nefco.org/introduction/board_members 2010-07-27
NEFCO, 2010d. http://www.nefco.org/how_to_work/project_cycle 2010-07-27
NEFCO, 2010e. http://www.nefco.org/projects/water_treatment 2010-07-27
NEFCO, 2010f. <http://www.nefco.org/financing/NMF/agriculture> 2010-07-27
NEFCO, 2010g. http://www.nefco.org/financing/bsap_trust_fund 2010-07-27
NEFCO, 2010h. http://www.nefco.org/financing/investment_fund 2010-07-27